Devoted to
TEXTILE
CHEMISTRY
BLEACHING
DYEING
PRINTING
FINISHING

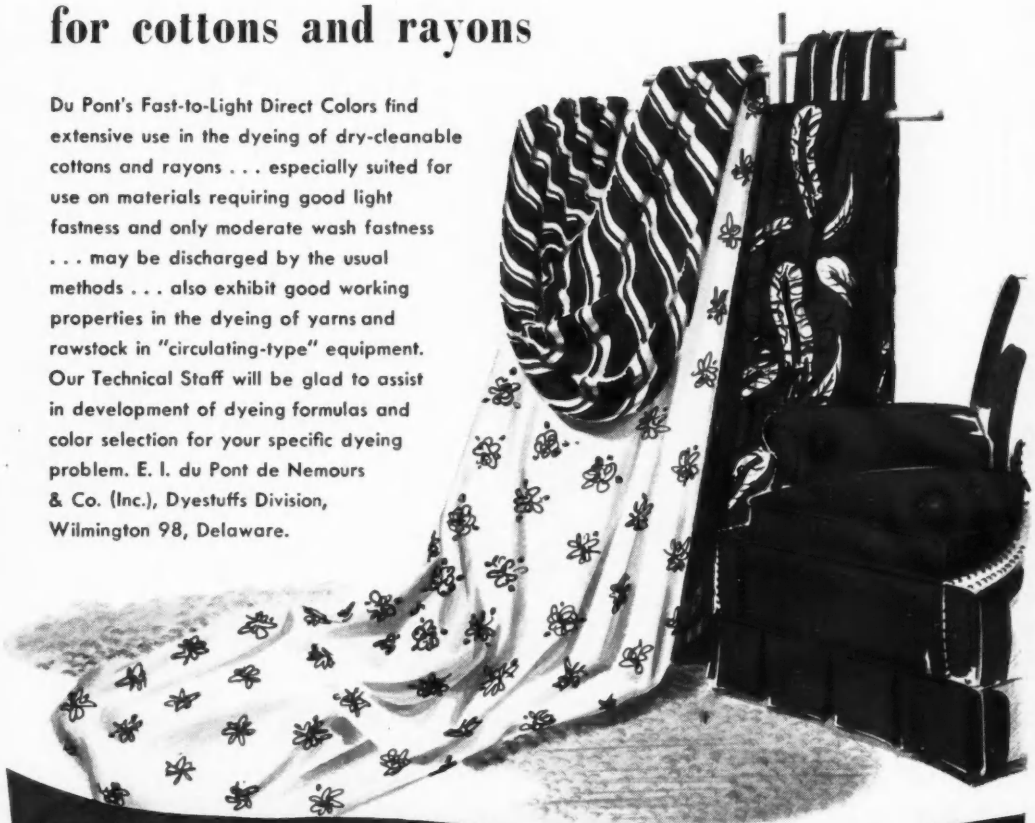
APRIL 19, 1948
VOLUME 37, No. 8

AMERICAN DYESTUFF REPORTER

Fast-to-light direct colors

for cottons and rayons

Du Pont's Fast-to-Light Direct Colors find extensive use in the dyeing of dry-cleanable cottons and rayons . . . especially suited for use on materials requiring good light fastness and only moderate wash fastness . . . may be discharged by the usual methods . . . also exhibit good working properties in the dyeing of yarns and rawstock in "circulating-type" equipment. Our Technical Staff will be glad to assist in development of dyeing formulas and color selection for your specific dyeing problem. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Division, Wilmington 98, Delaware.



Du Pont Dyestuffs

DU PONT
REG. U.S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

OFFICIAL PUBLICATION
of the
PROCEEDINGS
AMERICAN ASSOCIATION
OF TEXTILE CHEMISTS
AND COLORISTS

FORMASET 3R

A NEW, ENTIRELY DIFFERENT, THERMO-SETTING RESIN FOR SHRINKAGE CONTROL OF RAYONS

A shrinkage control resin which cannot retain chlorine or developer amine or "fish" odors.

FORMASET 3R imparts a considerable degree of crease resistance to shrinkage stabilization for the life of the fabric.

Our technical advisors are available for consultation at all times.

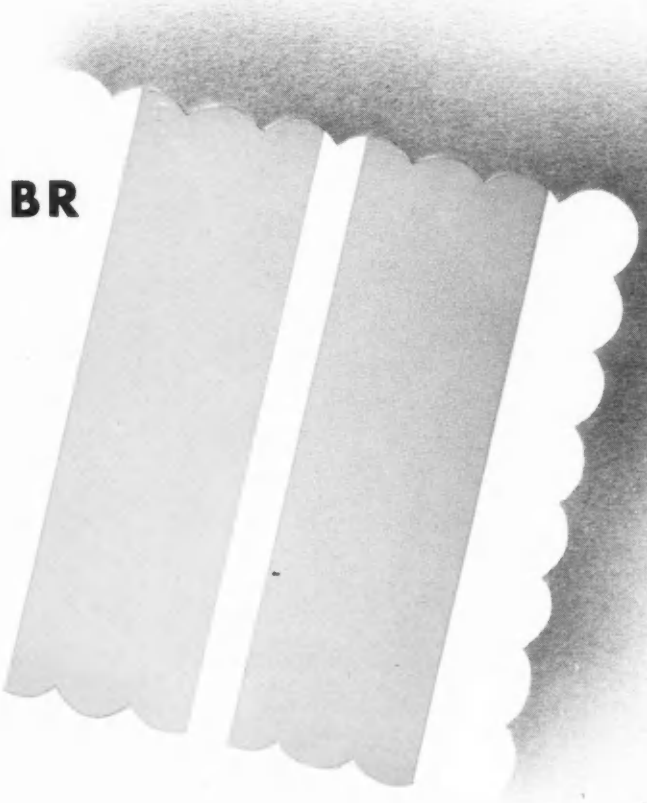
HARWICK CHEMICAL CORPORATION ... 10-10 44th Ave., Long Island City, N. Y.

AMANTHRENE* VAT COLORS
provide the answer to the demand for
better color fastness in textiles

Amanthrene

GREY BR

in double powder
or paste form



A new Grey, neutral yet not sombre in tone, suitable for use on cotton and rayon by the various vat methods. Unexcelled where maximum fastness to light, washing, chlorine or peroxide is important — equally satisfactory for printing of quality fabrics or dyeing of fine yarns and pieces.

Another of the Amanthrene range of superior vat colors. For detailed information on the whole range available, as well as data regarding your own particular requirements, consult our nearest branch. A.A.P. technicians are always happy to be of service.

AMERICAN ANILINE PRODUCTS, INC., 50 Union Square, New York, N. Y. • ***Plant:*** Lock Haven, Pa.
Branches: Boston, Mass. • Providence, R. I. • Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Chattanooga, Tenn. • **Dominion Anilines & Chemicals Ltd.** • Toronto, Canada • Montreal, Canada

IF YOU WANT

DURABLE Softness

Paramine TA is the modern cationic finish for acetate, viscose, cotton and mixed fibres. Mills using paramine TA for dress goods, glove fabrics, tricot and other types of knitted materials have found this finish offers added sales appeal.

Thorough penetration of Paramine TA assures a softness within the yarn itself that gives materials a full hand and desirable drape—its substantive action produces a durable, lasting finish —Application is simple.

Use Paramine TA

*Reg. U. S. Pat. Off.

WRITE FOR DETAILS OR DEMONSTRATION

Arkansas Co. INC.

Manufacturers of Industrial Chemicals for Over 40 Years

NEWARK, NEW JERSEY

Some Things Just Don't Penetrate

BUT . . .

ATCOPEN 2-T DOES EVERY TIME!

USE IT for wetting out and rewetting on all types of fabrics!

OUTSTANDING as a carbonizing penetrant or for use in neutral wetting operations.

ATCOpenetrate with ATCOPEN 2-T

Ask for ATCOPEN 2-T product sample and full information today!

Atlantic Chemical Co., Inc.

MAIN PLANT: CENTREDALE, RHODE ISLAND

BRANCH OFFICE: PATERSON, NEW JERSEY

Use ATCO Products

American Dyestuff Reporter, Vol. 37, No. 8, April 19, 1948. Published every other Monday. Copyright, 1948, by Howes Publishing Co., Inc., One Madison Ave., New York 10, N. Y. Domestic subscription, $5.00; Canadian, $6.00; Foreign, $10.00. Entered as second-class matter, Nov. 6, 1919. at the New York, N. Y., Post Office, under the act of March 3, 1879.

Worumbo's

"Wonderful Way with Woolens" includes yarn lubrication with . . . .

Fybrol 1115

"Worumbo's wonderful way with woolens" — long favored by discerning men and now equally admired by women of fashion — means beautiful appearance, rich soft texture, long wearability.

Worumbo's skilled craftsmen — proud and careful guardians of quality—know that, all the way from carding to finishing, their work is facilitated, the quality of finished product insured . . . by the use of FYBROL 1115, the *original* water-soluble wool fiber lubricant. They know that FYBROL 1115 helps Worumbo's "wonderful wearable woolens" to hold their shape, drape beautifully, wear wonderfully.

Why not let us demonstrate how FYBROL 1115 can help *you*, as it does Worumbo and other leaders, to obtain greater processing efficiency and economy . . . maximum sales appeal in your finished product.

Send today for new bulletin giving complete details on FYBROL 1115.

*Reg.—Pats. Pend.

Sonneborn Processing Specialties for the Textile Industries

Wool and Worsted Oils • Petroleum Sulfonates • Detergents and Dyeing Oils • Penetrants • Delustering Specialties • Warp Dressings • Finishing Sizes and Softeners • Water Repellents • Sulfonated Oils • Wetting and Rewetting Agents

Dept. W
Textile Chemicals Division
L. SONNEBORN SONS, INC.
New York 16, N. Y.
***Plant and Laboratories:* Nutley, N. J.**
***Refineries:* Petrolia and Franklin, Pa**

TERGITOL *wetting agents are* SPECIFIC

If you use water or an aqueous solution for one of the following operations, a *specific* TERGITOL wetting agent can save you money and processing time:

PENETRATING . . . porous materials such as textile fibers, paper, and leather.

WETTING . . . pigments, dyestuffs, powders, clay, cement, dust, and other dry materials.

SURFACE SPREADING on glass, metal, wood, plastic, or foliage surfaces — which ordinarily resist wetting.

EMULSIFYING . . . oils, resins, and chlorinated or water-insoluble solvents.

DE-EMULSIFYING . . . many water-oil and solvent-water emulsions.

TERGITOL 7 . . . for dilute aqueous solutions containing less than 1 per cent dissolved solids.

TERGITOL P-28 . . . for water solutions containing 2 to 5 per cent inorganic salts or 1 to 2 per cent alkalies.

TERGITOL 4 . . . for solutions containing from 1 to 10 per cent acids or salts, or 2 to 5 per cent alkalies.

TERGITOL 08 . . . for solutions containing 10 to 20 per cent acids or alkalies.

TERGITOL EH . . . for solutions containing 20 to 30 per cent dissolved inorganic acid, base, or salt.

CARBIDE and CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street, New York 17, N. Y.

Offices in Principal Cities

In Canada:

Carbide and Carbon Chemicals, Limited, Toronto

TERGITOL is a registered trade-mark of C & CC.

The five TERGITOL wetting agents are powerful, fast-acting surface-tension depressants. These easy-to-use liquids are available in commercial quantities. They are inexpensive—a little goes a long way. For help in choosing the most suitable TERGITOL wetting agent for your application call or write our nearest office. When writing, please address Dept. A-4.

FOR YOUR INFOR[M]ATION

MERLONS offer textile industry new, wider range of finer finishes

The new Merlons, a comprehensive line of clear, odorless and colorless solvent-free resin dispersions, offer a complete range of durable finishes for all fibers and fabrics. They can impart improved luster, crispness and fullness, better wear and abrasion resistance.

Following are a few specific uses for the different Merlons:

1. Abrasion Resistant Finish for work clothes and industrial fabrics	Merlon BR
2. Rug Backing	Merlon SP
3. Durable finish for sheeting	Merlon BR
4. Crisp, firm, curtain finish	Merlon KR
5. Stiffening for interlinings	Merlon KR
6. Pigment binder	Merlon KR, BR
7. Coatings	Merlon S, SP or BR
8. Adhesives	Merlon KR or BR

A further guide to textile technologists who are looking for new ways to improve their products is this short description of the Merlon family. (Various blends and combinations can be worked out to many intermediate degrees of stiffness or durability.)

Product	Resin	% Solids	Plasticized	Approximate Particle Size in Microns	pH
Merlon S	Polystyrene	40	No	1.0	8-9
Merlon SP	Polystyrene	40	Yes	1.0	8-9
Merlon BR	Polyvinyl Butyral	50	Yes	0.5-1.0	10
Merlon BRS	Polyvinyl Butyral	50	Yes	0.5-1.0	10
Merlon KR-1	Polyvinyl Acetate	55	No	1.5-2.0	4-6
Merlon KR-2	Polyvinyl Acetate	55	No	1.0	4-6
Merlon KR-3	Polyvinyl Acetate	35	No	0.2	3.5-5.5
Merlon KR-4	Polyvinyl Acetate	55	No	2.0-3.0	4-6
Merlon KR-5	Polyvinyl Acetate	55	No	1.5-2.0	3.5-5.5

All Merlons are applied from a dilute aqueous bath. Normally low concentrations are used to deposit from one to five percent resin on the fabric. No special equipment is necessary for application, since the Merlons require no curing or after-treatment.

Complete data on each of these Merlons is available. But please tell us your particular problem or particular fabric so that we can send you the data we feel will be most helpful. **Include this information with the coupon on the opposite page and mark it D-1.**

Stymer, Milmer, Syton, Merlon: Reg. U. S. Pat. Off.

Treated shoe linings control athlete's foot

A new development of Monsanto research is the adaptation of Milmer, the company's 8-quinolinolate to shoe linings as an effective fungicide for athlete's foot.

Many cases of athlete's foot are prolonged because the foot is repeatedly re-infected by the fungi taking up residence within the shoe.

In recent tests, men afflicted with athlete's foot wore shoes with Milmer-treated liner fabric. Shortly after they started wearing the shoes, the infection cleared. Several of the men said that they would willingly pay $5 extra per pair for these shoes.

Milmer, Monsanto's mildew inhibitor, is an outstanding preservative for fabrics. It is effective against soil and air-borne fungi. It is fast to weather and washing. It is non-toxic and odorless.

Fabrics utilizing Milmer include those for awnings, outdoor furniture, sporting goods and tents.

(Check D-2 on the coupon for additional Milmer data.)

SYTON for worsted spinning

Typical of the reports from mills using Syton for their spinning of worsted yarns are these:

1. A 16% production increase in spinning 60's yarn with 1¼ to 1½% Syton product on the weight of wool. Less fly waste in roving and reduction in ends down in both roving and spinning.

2. On 56's wool, yarns showed a 15% reduction in number of ends down and a strength increase of approximately 12%.

3. On 24's singles yarn, twist was reduced 20% and the strength of the yarn was still greater than the untreated at standard twist.

(Check D-3 on the coupon for additional Syton data.)

STYMER for acetate sizing easier to handle

Mills using Stymer for better sizing of acetate have discovered additional important benefits in handling:

1. Stymer, unlike the natural gels and starches, is a carefully-controlled synthetic product. It is stable indefinitely, does not deteriorate in use or in storage.

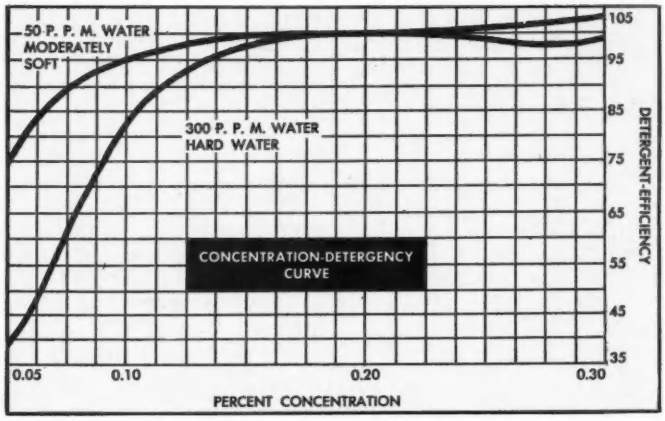
2. Stymer forms a true solution, does not set up in pipes, boxes or tanks. It does not make necessary wasteful, time-consuming removal at the end of each working period as do the sizes which gel.

Of special importance to the slasher operators is the new sodium salt of Stymer which is far more convenient to handle. It eliminates the pH control problem and also the use of sodium hydroxide in the plant.

These convenience and economic factors, added to the following advantages, have led to the adoption of Stymer as standard for acetate sizing in many progressive mills:

- New toughness at high humidity.
- New flexibility at low temperature.
- Elimination or minimizing of static in slashing and weaving.
- Elimination of sticking to dry cans.
- Minimized shedding.
- Broken filaments in warp picked up.
- Application in size baths of temperatures from 130° to 160° F.
- Ease of removal.

For more Stymer information mark item D-4 on the coupon on this page.



STED proved a true detergent for all textile cleansing operations

The effectiveness of STED, the new all-purpose detergent, has been proved under actual working conditions in scores of mills in all types of textile washing and scouring operations.

Sted is *not* just another wetting agent with some detergent effects; it is a powerful and active detergent whose scouring and cleansing action is demonstrated in the above chart.

Sted is non-sudsing and non-foaming and distributes the soil quickly into the bath without surface scum. It is non-substantive, therefore extremely low concentrations are effective. It is not decomposed by acid or alkali and does not deteriorate by oxidation or at high temperatures.

Lower prices recently announced for Sted make it especially welcome in all cost-conscious mills.

STED effective in hard water

One of Sted's outstanding properties is its ability to clean efficiently in hard water without the addition of water softeners. At the recommended 0.2% concentration, Sted is as efficient in hard as it is in soft water (see chart above).

The inability of soap to scour in hard water is due to the formation of insoluble sticky lime and magnesium curds which often re-deposit on the material being cleaned. Sted forms no such deposit, therefore is quickly rinsed from the fiber or fabric.

For more details on Sted, mark D-5 on the coupon below.

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY . . . WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, TEXTILE CHEMICALS DEPT.
Desk ADT 4, 140 Federal Street, Boston 10, Mass.

Please send me information on the following subjects as covered in your advertisement:

D-1 . . . . . D-2 . . . . . D-3 . . . . . D-4 . . . . . D-5 . . . . . .

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

CAMEL Dyes

THE CAMEL LINE OF
DEPENDABLE DYESTUFFS
has served the textile mills of America
without interruption since
1876.

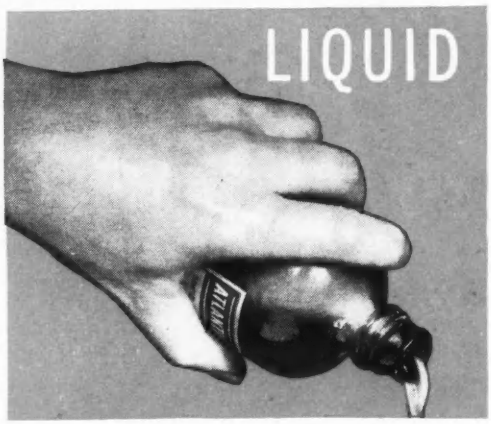
This broad experience assures
PROMPT • EFFICIENT • ECONOMICAL SERVICE
TO MEET ALL DYESTUFF REQUIREMENTS

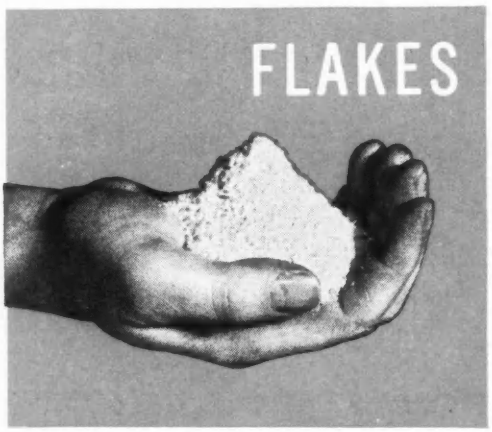
JOHN CAMPBELL & COMPANY, INC.

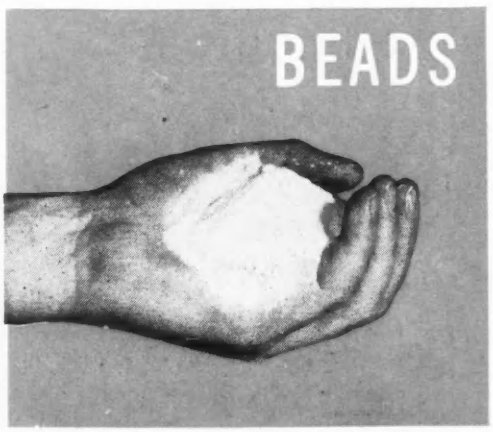
75 HUDSON STREET • NEW YORK CITY
TELEPHONE: BArclay 7-6228-6229
2520-22 NORTH BROAD STREET, PHILADELPHIA 32, PA. • TEL. RADCLIFFE 5-7103-4
BRANCH OFFICES AND WAREHOUSES:
BOSTON EAST CLEVELAND, OHIO ATLANTA, GA.

ATLANTIC PETROLEUM CHEMICALS

Ultrawet K's are immediately available as







Ultrawet K's

Have *you* tried these new high-quality, low-cost detergents?

The superior wetting, sudsing and detergent properties of Atlantic's new K series Ultrawets offer distinct advantages for cleaning compounds, cosmetics and many industrial processes.

Ultrawet K's are more efficient than soap, especially in hard water, and their low prices make them more economical. *They eliminate the trouble and expense of water softening.*

Ultrawet K's are immediately available in three different forms—liquid, flakes, and beads. As a liquid, they are pale amber in color and odorless (no kerosene or sludge odor). As flakes and beads, they approach the compounder's ideal of whiteness and lack of odor.

The latest Atlantic development in alkyl aryl surface-active agents, Ultrawet K's are produced by an organization that has been producing detergents and wetting agents for over 10 years. They are backed by Atlantic's great research facilities. Here are the physical data:

	Ultrawet K Flakes	*Ultrawet 30K Liquid*	*Ultrawet 5K Beads*
Wt. % Active Sulfonate—min.	**85**	**25.5**	**35**

For samples, further information and quotations write or wire

THE ATLANTIC REFINING COMPANY

CHEMICAL PRODUCTS DIVISION

260 South Broad Street, Philadelphia 1, Pa.
Chamber of Commerce Building, Pittsburgh, Pa.
Hospital Trust Building, Providence 1, R. I.

Olate BRINGS OUT THE BEST IN YOUR SYNTHETICS

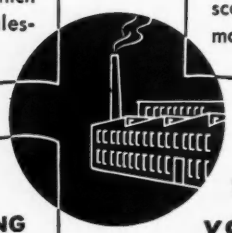
● If synthetic processing is your responsibility, let Olate shoulder part of the load. Olate has a time-tested reputation for exceptional wetting out, detergent and lubricating qualities. This pure, neutral, low titer soap is widely used throughout the industry because of its efficiency, economy, and safety. No other soap can do more to help you turn out quality yarns, hosiery, knitted fabrics or woven piece goods.

FOR YARN FINISHING

You get thorough scouring with Olate . . . rinsing is fast and complete . . . protection against oxidation, rancidity, and odor development is exceptional. Olate-scoured yarns give fabrics the pleasing finish which means so much to the eye-appeal and sales-appeal of the finished product.

FOR HOSIERY SCOURING AND DYEING

Cleansing action starts the minute Olate's fluid solutions penetrate the hosiery. Wetting out is fast and thorough. You get unusual freedom from uneven dyeing with Olate scouring. And Olate costs you far less than most proprietary scouring oils.



FOR SCOURING AND DYEING WOVEN PIECE GOODS AND KNITTED FABRICS

Olate provides exceptional freedom from these common trouble makers—uneven shrinkage, streaks, dye blotches, and chafe marks—because of its rapid wetting out, gentle cleansing action, and excellent lubricating properties. Olate can do much to guard against costly, wasteful tie-ups and rejects.

there's a place in your plant where Olate can help . . . try it!

Olate

Safe and efficient for every soap usage.

● PROCTER & GAMBLE ●

INDANTHRENES
for cotton hosiery

cotton hosiery dyed with **INDANTHRENES**
are fast to • laundering chlorine
perspiration • crocking • light

GENERAL DYESTUFF CORPORATION
435 HUDSON STREET • NEW YORK 14, NEW YORK
BOSTON • CHARLOTTE • CHICAGO • PHILADELPHIA • PROVIDENCE • SAN FRANCISCO

There's a Time for Giving

DOROTHY GABRIEL

Popular photographer's model, who posed for this advertisement says, "It seems quite obvious to me that the more you give the more you get. Hosiery that has a sheer, smoky, dull appearance gets my vote every time."

. . . and the amount of giving all too frequently determines the amount of getting. So it is with hosiery. Added volume, particularly in a competitive market, is largely determined by what you give as a manufacturer.

Many of today's new yarns make it doubly difficult for manufacturers to give hose that has soft, sheer, eye-caressing dullness. To meet these new yarn problems, Fancourt Chemists, working with a number of the country's outstanding mills, have recently developed many new finishes. These Fanco finishes can improve the appearance of your hosiery, by helping you to give more hosiery value. Calling in a Fancourt field man will place this information at your disposal.

W. F. FANCOURT CO.

PHILADELPHIA, PA.

In the South, Howard A. Virkler, Greensboro, N. C.

Solving Finishing Problems Since 1904

• calcochrome alizarine gray 2BLS
• excellent fastness
• unusual exhaustion properties
• a money saver

Here is a new and improved wool dye . . . unsurpassed as a base for seasonable grays . . . also an excellent shading color for buffs, tans and taupes. Especially desirable for automotive and upholstery fabrics because of its high degree of fastness to light and water spotting, Calcochrome Alizarine Gray 2BLS is equally suitable in union, acid or chrome formulations for apparel fabrics.

Economy of application is one of the important advantages of Calcochrome Alizarine Gray 2BLS. When applied neutral its superior exhaustion property gives better color value for union dyeing as compared with the more common Alizarine Gray 2BL types.

Calco's new Color Announcement Bulletin containing complete information on this new dye will be sent to you on request.

Calcochrome Alizarine Gray 2BLS shows excellent fastness to:

LIGHT · SEA WATER · PERSPIRATION · WASHING · WATER SPOTTING

Calco

CALCO CHEMICAL DIVISION • AMERICAN CYANAMID COMPANY

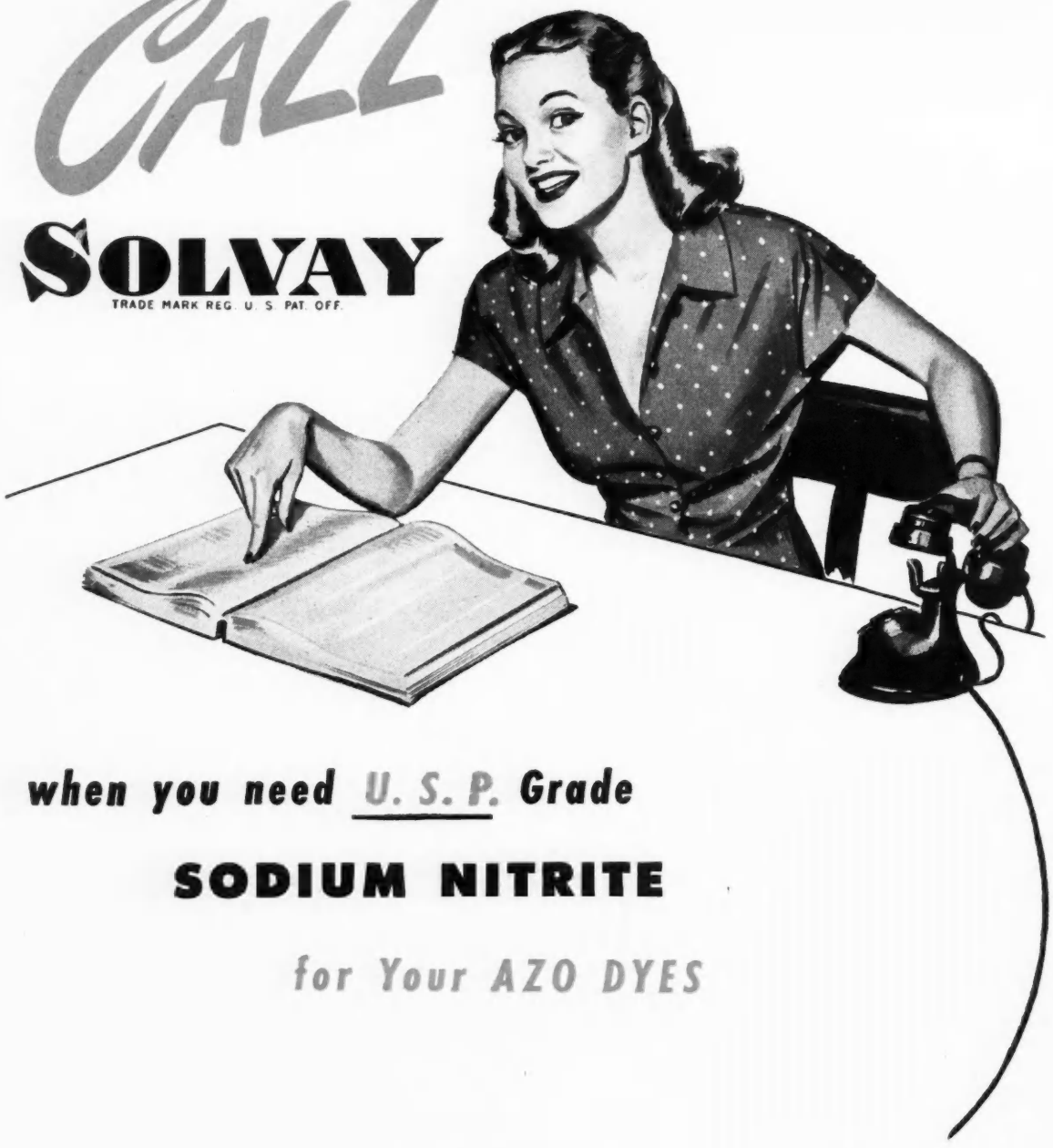
Bound Brook, New Jersey

New York · Chicago · Philadelphia · Boston · Charlotte · Providence

CALL

SOLVAY

TRADE MARK REG. U. S. PAT. OFF.



when you need U. S. P. Grade

SODIUM NITRITE

for Your AZO DYES

The secret of quality azo dyes

SOLVAY SALES DIVISION
Allied Chemical & Dye Corporation
40 Rector Street, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY
TRADE MARK REG. U. S. PAT. OFF.
SODIUM NITRITE
(U. S. P.)

a NEW development
applicable to all fabrics
REPCOLENE
K-50

BECCO PERACETIC ACID 40%

A *New Safe* Bleaching Agent for Fabrics Containing Acetate Rayon

OUTSTANDING

For bleaching of fabrics where fiber modification of the acetate rayon must be avoided, (i. e. fabrics to be cross dyed, fabrics requiring the inherent solubility and fusability properties of acetate rayon).

EXCELLENT

Mote removal with full white in the bleaching of acetate rayon and cotton goods *without* modification of the acetate rayon.

ATTRACTIVE

A simple one step process for fabrics hard to bleach and sensitive to conventional bleaching procedures.

IDEAL

For fullness of hand and body of bleached goods.

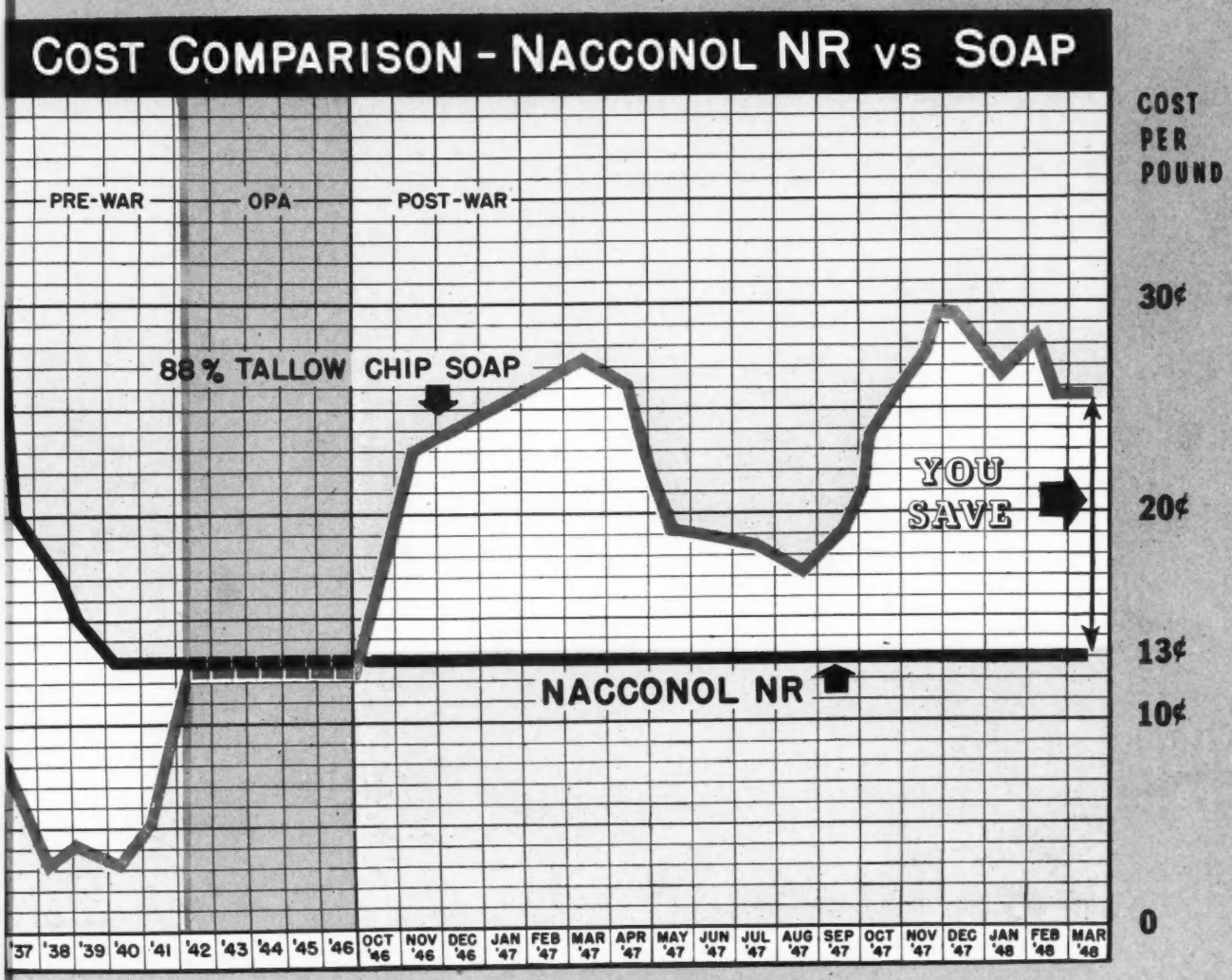
BECCO SALES CORPORATION

AGENTS FOR BUFFALO ELECTRO-CHEMICAL COMPANY, INC.

BUFFALO 7, NEW YORK

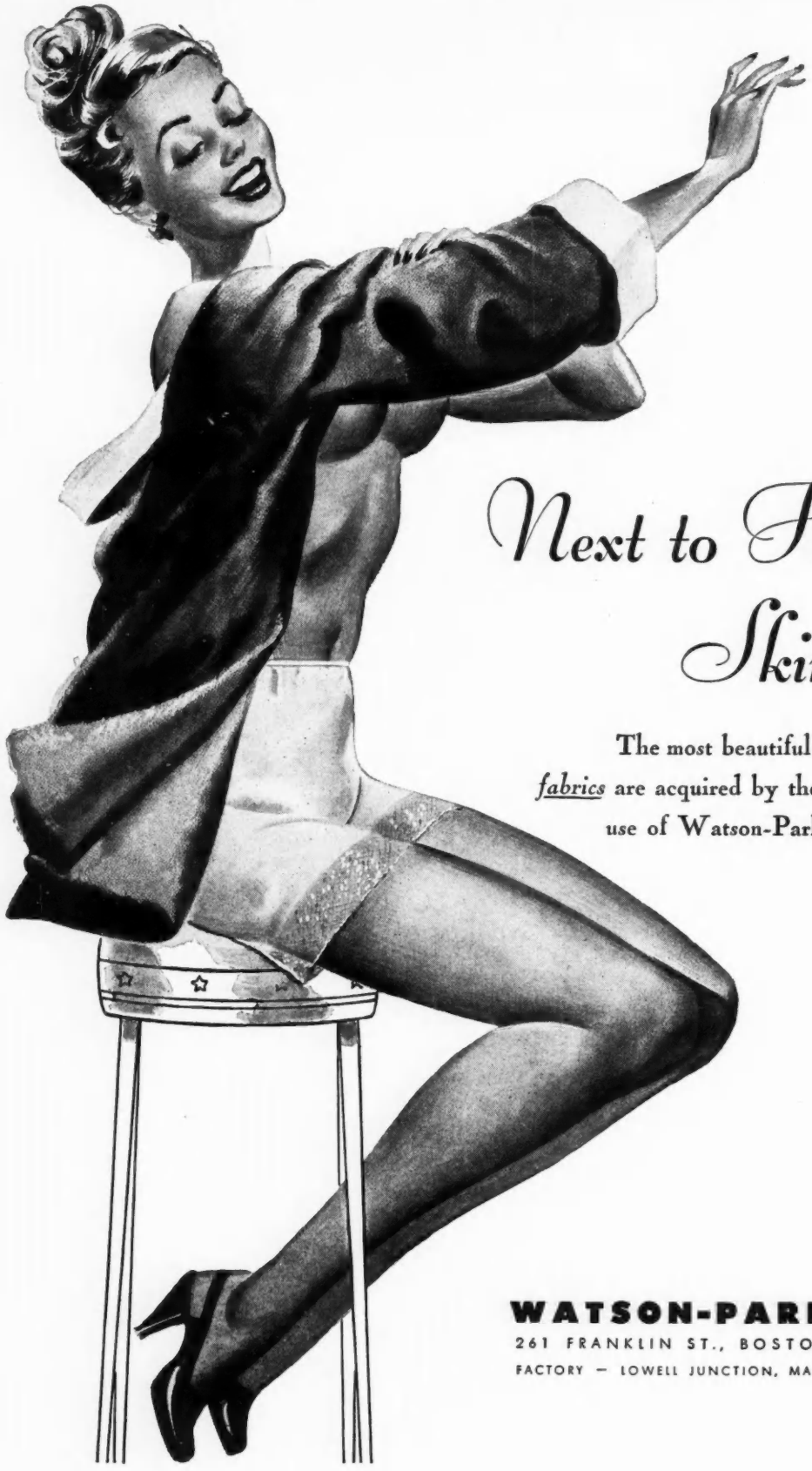
New York Boston Philadelphia Chicago Charlotte

Mill Executives: Save on Soap Costs by switching to NACCONOL* NR


COST COMPARISON - NACCONOL NR vs SOAP
COST PER POUND
PRE-WAR
OPA
POST-WAR
88% TALLOW CHIP SOAP
YOU SAVE
NACCONOL NR
30¢
20¢
13¢
10¢
0
'37 '38 '39 '40 '41 '42 '43 '44 '45 '46 OCT '46 NOV '46 DEC '46 JAN '47 FEB '47 MAR '47 APR '47 MAY '47 JUN '47 JUL '47 AUG '47 SEP '47 OCT '47 NOV '47 DEC '47 JAN '48 FEB '48 MAR '48

National Aniline DIVISION • ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR ST., NEW YORK 6, N. Y. • BOSTON • PROVIDENCE • PHILADELPHIA • CHICAGO • SAN FRANCISCO • PORTLAND, ORE. GREENSBORO • CHARLOTTE • ATLANTA • NEW ORLEANS • CHATTANOOGA • TORONTO



Next to Her Skin . . .

The most beautiful *finishes on fabrics* are acquired by the consistent use of Watson-Park products.

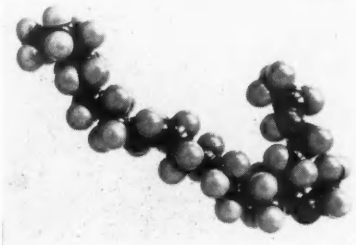
WATSON-PARK CO.
261 FRANKLIN ST., BOSTON, MASS.
FACTORY — LOWELL JUNCTION, MASSACHUSETTS

ONYX IONICS

April — *Newsworthy Items for Technologists and Production Men* — *1948*

Onyx Industrial Research

Fifteen years ago this year the first of the many research projects supported by the Onyx Oil & Chemical Company in principal outside institutions was initiated. Since that time this policy of sponsoring research on important phases of the company's activities in national and recognized research laboratories has been extended to include investigations in many parts of the United States.



We are proud of the record of the past fifteen years, and confidently expect an equally productive period in the years to come in the development of new products for industry and in the obtaining of significant scientific data pertaining to Onyx products.

NEW DEVELOPMENTS

For Further Details Write Onyx

If You Want Durable Crush Resistance, investigate what you can count on from NCF Paste. This resin finish is excellent for cotton, all rayon fabrics or cotton-rayon mixtures. No. 77

•

When Hard Water Works Against You in any emulsifying, dispersing or detergent process, the quickest, easiest and lowest cost way to lick the problem is to use Neutronyx 330—the non-ionic surface-active detergent, emulsifier and dispersant—as an auxiliary. No. 78

•

Want Body and Thickness for a Textile? Then investigate Onyx Stearo Glyceryl Sulfate N. This sulfonated product has a much higher SO_3 content than ordinary sulfonated tallows, and shows much greater resistance to hard water and electrolytes. No. 79

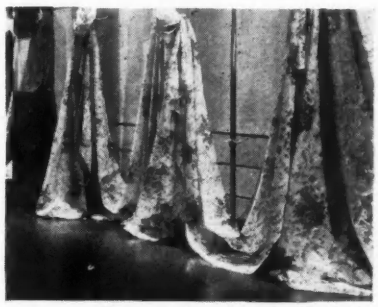
•

Write for the New Onyxsan Bulletin (Onyx Technical Bulletin TX-1). This six-page manual contains the story of the latest developments in The Onyxsans. It is well worth studying if you're interested in permanent lofty hands on bemberg, rayon or acetate-cotton textiles. No. 80

For Improved Stiffening and Sizing of Cotton, Rayon, Acetate and Nylon Fabrics

The Xyno Resins offer an interesting range of effects in body and stiffness on fabrics of all kinds. These resins are water dispersions of thermoplastic synthetic resins, which dry to a clear, tough finish without impairing luster, and which require no curing or high temperature "setting." Goods are treated in the usual manner.

Resin 362 is a viscous dispersion, providing the stiffest hand of the three Xyno Resins. It is particularly useful on ninons, marquisettes and organdies.



Photograph courtesy Pacific Mills

Resin S 69 is a water-thin dispersion imparting a unique, dry, "springy" hand which is particularly attractive on nylon, rayon and acetate nettings. S 69 provides the best wash fastness of all the Xyno Resins.

Resin AA 40 is a thin dispersion with a very general range of application, though it is particularly useful in sizing and stiffening ribbons and dress piece goods.

Maprofix Paste Does a Superior Job of Wool Scouring

Maprofix Paste is one of the most potent of scouring agents. It leaves wool skeins, raw wool and wool and worsted piece goods in firmer, more resilient, fuller bodied condition than the best grade of soap, and rinses out faster and better. Scouring costs with Maprofix Paste are materially less than with high quality soap.

A plant-scale tryout of Maprofix Paste will convince you of its superior emulsifying and detergent action. We shall be glad to work out the details of such a test with you at any convenient time.

If you'll ask for Onyx Technical Bulletin 15-T, you can study the chemical and physical characteristics, advantages and performance of Maprofix Paste in detail.

Cationic Moth-Proofing Lasts!

Two Onyx cation-active quaternary compounds have been highly successful in moth-proofing. Not only is the effect obtained notably resistant to dry cleaning and laundering, but treated goods have marked bacteriostatic and fungistatic properties. Moreover, considerable softening action is also obtained during the moth-proofing treatment.

Imularv P is sold in 50% water solution . . . Imularv S in 75% alcoholic solution. The former is usually employed in the pad, using a 2% solution with the squeeze adjusted to 100% take-up. Treated goods are hydro-extracted and dried. Imularv S is used in organic solvent solution, usually applied as a spray, although it is often used in fresh solvent after dry cleaning. For spraying, a 1% solution of Imularv S in Varsol, carbon tetrachloride, etc., is used. For use after dry cleaning, a 1% solution in regular dry cleaning solvent is employed.

This Scroop is Durable to Ageing and Weathering

Onyx Silk-O-Rays give you a much better scroop on rayon, acetate and cotton knit goods or mixed constructions of these fibers than you can get with acetic, tartaric or other organic acids. The finish is durable to ageing and weathering. All of the Silk-O-Rays are stable to heat and hard water, and store well without deterioration.

Goods are treated in the quetsch, padder or dye box, followed by drying in the usual manner.

The particular Silk-O-Ray most suited to your goods can best be determined by trying out all three—Silk-O-Ray F, Silk-O-Ray NS and Silk-O-Ray SG. Write for Onyx Technical Bulletin 17-T.

onyx CHEMICALS FOR DYEING • FINISHING • PRINTING

ONYX OIL & CHEMICAL COMPANY

JERSEY CITY 2, N. J.

CHICAGO • PROVIDENCE • CHARLOTTE • ATLANTA • LOS ANGELES

In Canada: Onyx Oil & Chemical Co., Ltd. Montreal, Toronto, St. Johns, Que.

For Export: Onyx International Jersey City 2, N. J.

POSSESSES ALL THE ADVANTAGES OF SOAP

HYTERGEN
the MODERN DETERGENT

SHOWS POWERFUL SCOURING ACTION AND VOLUMINOUS FOAM

HIGHLY RESISTANT TO HARD WATER, ACID, ALKALI, ETC.

CLEANS ALL TYPES OF FABRICS

QUICK FACTS ABOUT HYTERGEN

1. Possesses exceptional scouring action.
2. Produces a heavy, continuous foam.
3. Is an outstanding emulsifying agent.
4. May be used in acid and alkaline solutions.
5. Is unaffected by hard water or metallic salts.
6. Dissolves readily in water.
7. When used with soap, Hytergen prevents formation of insoluble lime soap curds.
8. Can be used on the most delicate fabrics and colors to good advantage.
9. Used to scour wool fabrics of open weave or soft spun yarns without any danger of felting.
10. Is an excellent dispersing agent for dyestuffs.
11. Promotes more level dyeing and even shades.

Hytergen is being widely used for the soaping, scouring, wetting-out, and boiling-off of all types of fabrics. Its use is positive insurance against all hard-water troubles. Hytergen is often employed together with soap to increase the action of the soap and at the same time prevent the formation of lime soap curds. Concentrations as low as ½-1 lb. per 100 gallons of water are satisfactory for most scouring operations.

Investigate this modern synthetic organic detergent. Write today for your copy of the Hytergen Technical Bulletin.

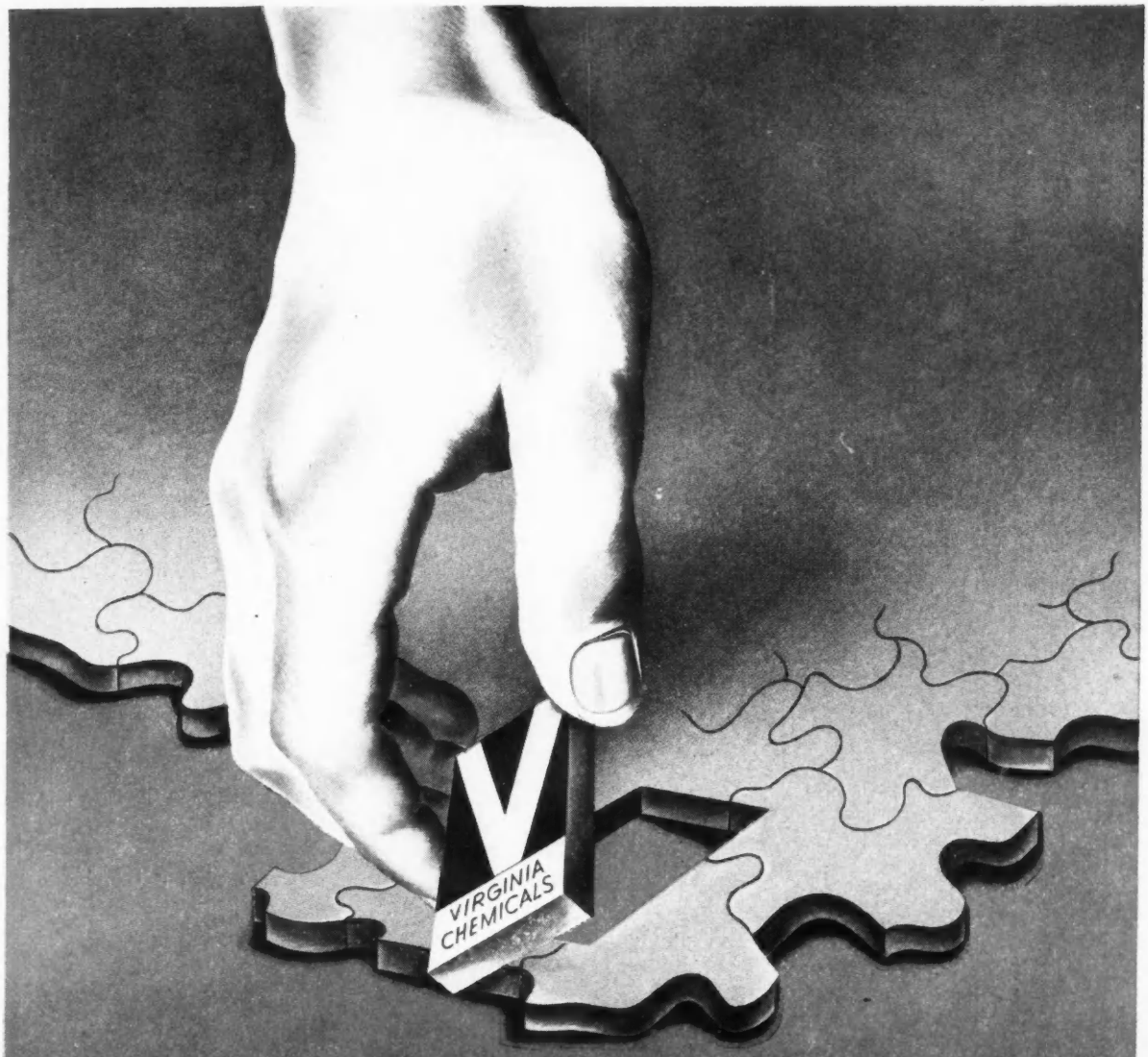
HART PRODUCTS CORPORATION • 1440 Broadway, New York 18, N.Y.

Hartex Products

Rayon Oils & Sizes	Conditioning Agents	Cationic Softeners
Nylon Oils & Sizes	Scrooping Agents	Cotton Warp Dressings
Kier Bleaching Oils	Splashproof Compounds	Wetting-Out Agents
Finishing Oils	Delustrants	Weighting Agents
Synthetic Detergents	Leveling Agents	Mercerizing Penetrants

Hart Products

based on research



our know-how fits your problems

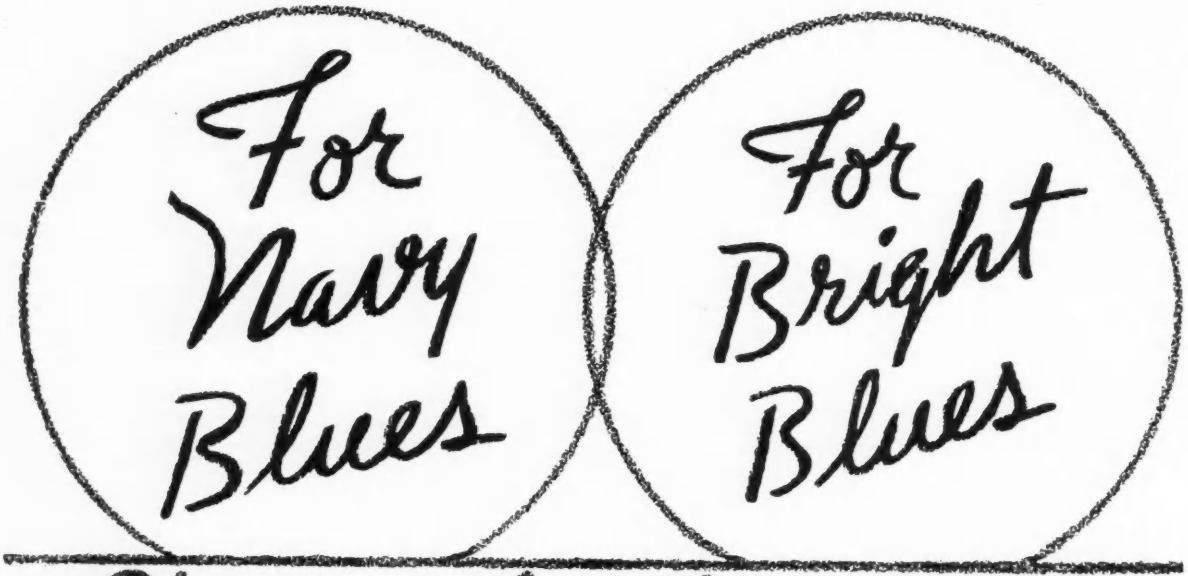
For 50 years, users of industrial chemicals here and abroad have looked to "Virginia" for products of uniform purity and excellence. More, they have relied heavily upon "Virginia's" versatile engineering staff for research and consultation in the perfecting of their products and processes. This technical cooperation is freely available to you. "Virginia's" vast experience, teamed with your own specialized knowledge, will find a ready answer to your problems.

Concentrated "Virginia" Sodium Hydrosulphite ($Na_2S_2O_4$) is a dependable reducing agent in cotton vat dyeing, stripping, and decolorizing. It is stable, free-flowing, uniform, and completely soluble. Send for folder. VIRGINIA SMELTING COMPANY, West Norfolk, Virginia.

V VIRGINIA *Chemicals*

NEW YORK • BOSTON • DETROIT

50 YEARS OF SERVICE TO INDUSTRY



Pharmasols* Blue G Blue GB

THESE azoic colors, for printing cotton, linen or rayon, produce Navy Blue of good fastness at a low cost. In combination with the Pharmasol Yellows they produce deep Browns.

PHARMASOLS are stabilized solutions, adjusted to the most practical concentration, which can be easily applied with a maximum of efficiency.

PHARMASOLS do not decompose and thereby they overcome the otherwise problems of troublesome dissolving.

*Reg. U. S. Pat. Off.

Indigosol* BLUE IBC

THE outstanding soluble vat color for producing bright Blues in any depth, of excellent fastness, is Indigosol Blue IBC. It is suitable for dyeing, padding and printing on cotton, linen or rayon (excepting acetate fibers) where maximum fastness is required.

Indigosol Blue IBC is an important member of the group of very fast Indigosols, all of which are readily soluble and easily developed.

CARBIC COLOR AND CHEMICAL CO., INC.

451-453 Washington Street, New York City

BRANCHES:
PHILADELPHIA
PROVIDENCE HAMILTON, ONT.
CHARLOTTE, N. C.

IMPORTERS OF THE MANUFACTURES OF DURAND & HUGUENIN S. A. BASLE, SWITZERLAND

EXCLUSIVE DISTRIBUTORS OF PHARMASOLS PHARMOLS PHARMACINES

Representatives: Los Angeles (Hathaway Allied Products)

AMERICAN

DYESTUFF REPORTER

LOUIS A. OLNEY, D.Sc.
Directing Editor

NORMAN A. JOHNSON, B.T.C.
Managing Editor

MYRON D. REESER
Advertising Manager

GRACE B. BURTON
Production Manager

M. H. MORGAN
Circulation Manager

Official Publication of the Proceedings of the American Association of Textile Chemists and Colorists

•

Published every other Monday by
HOWES PUBLISHING COMPANY, INC.
One Madison Avenue, New York 10, N. Y.

A. P. HOWES
President

C. R. HOWES
Vice President

H. F. CRAWFORD
Treasurer

M. D. REESER
Secretary

C. ESSENBREIS
Asst. Secretary

•

Also Publishers of
KNIT GOODS WEEKLY
TEXTILE COLORIST
AND CONVERTER
HOSIERY MERCHANDISING

•

April 19, 1948

VOLUME 37 NUMBER 8

Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Articles

Preliminary Steps in the Development of an Accelerated Aging Test to Light..... 251
Dorothy Siegert Lyle, Pauline Beery Mack, Frederic Bonnet, Arthur R. Wachter and Charles W. Rice

Testing of Fungicidal Materials Against Pathogenic Fungi 257
Louis C. Barail

• Departments

Trade Notes—New Products..... 275

• Proceedings of the American Association of Textile Chemists and Colorists

Membership Applications P260, P261, P265
Colour Index P261
February Meeting, R. I. Section.....P261
March Meeting, Rhode Island Section.....P261
Calendar P261
Report of Technical Committee, New York Board of Trade P262
Meeting, Western New England Section.....P262
Meeting, New York Section.....P262
Meeting, Philadelphia Section P262
Philadelphia Textile Institute Student Chapter....P262
Employment Register P262
Review of the German Technical Reports.....P263
Thomas R. Smith
Electrolyte Builders for Surface Active Agents....P266
J. C. Harris
Hosiery Group Meeting
Nylon Staple in Hosiery.....P271
W. B. Vincent

Copyright, 1948, Howes Publishing Co., Inc.

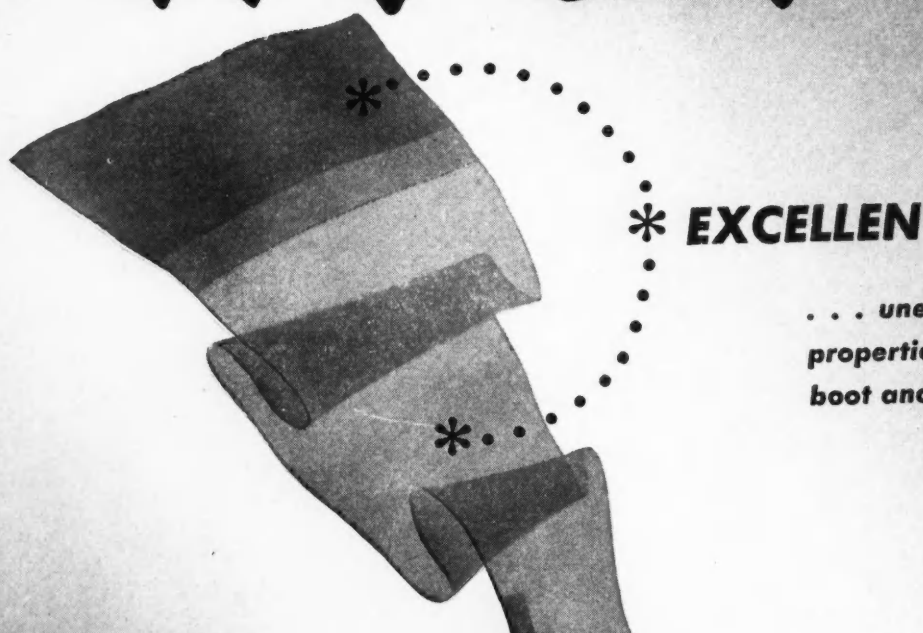
for

Uniform

dyeing of fine denier

ladies' nylon hosiery

NYDYE



* EXCELLENT UNION

. . . unexcelled union dyeing properties between 15 denier boot and 30 or 40 denier welt.

In addition to giving you excellent union in dyeing, N Y D Y E colors are extremely fast to washing.

ALTHOUSE

Chemical Company, Inc

READING · PA.

DORC

IN

TEXTILE during u exposure to them light; a heat; perspi kinds, notabl dry and wet of laborator is to ascerta time how fa their entire p

Borton and son, LaBossi and Borton, (2), however tive value of textile tests h centage of ac performance This is true color-fastness the failure jective of lal simulation use, was fou posure of th testing usual do more tha fabrics dyed and (2) wh nately or si one agency, which may l alone is inv

If reasons to the beha tions of con therefore, it that provisi increasing th results simil

AMERICAN
DYESTUFF REPORTER

VOLUME 37 APRIL 19, 1948 NUMBER 8

Preliminary Steps in the Development of an Accelerated Aging Test to Light

DOROTHY SIEGERT LYLE and PAULINE BEERY MACK
Ellen H. Richards Institute, The Pennsylvania State College

and

FREDERIC BONNET
ARTHUR R. WACHTER
CHARLES W. RICE
American Viscose Corporation

INTRODUCTION

TEXTILE fabrics undergo degradation during use or storage as a result of exposure to various agencies—among them light; atmospheric gases; humidity; heat; perspiration; strains of various kinds, notably abrasion; laundering; and dry and wet drycleaning. The objective of laboratory testing of textile fabrics is to ascertain within a short period of time how fabrics will perform during their entire period of use.

Borton and Butz, with Moore, Williamson, LaBossier, Kuschke, and Mack *(1)*, and Borton, Walker, Mack, and Seibert *(2)*, however, have shown that the predictive value of the currently applied official textile tests have a comparatively low percentage of accuracy in comparison with the performance actually found during use. This is true particularly of the test for color-fastness to light. The reason for the failure of this test to meet the objective of laboratory testing—namely, the simulation of results obtained during use, was found to be two-fold: (1) Exposure of the fabrics during laboratory testing usually is not sufficiently long to do more than screen from all others those fabrics dyed with the most fugitive dyes; and (2) when a fabric is exposed alternately or simultaneously to more than one agency, performance differs from that which may be expected where one agency alone is involved.

If reasonably accurate predictions as to the behavior of fabrics under conditions of consumer usage are to be made, therefore, it seems reasonable to suppose that provision must be made: first, for increasing the severity of the test until results similar to those experienced in use may be obtained; and second, for providing means of combining the effects of the different agencies which may cause degradation of fabric strength, dimensions, and color.

The investigation described in this report was made as a contribution toward the development of tests for the color-fastness of textiles with respect to light: (a) by employing a type of equipment in which fabrics can be exposed to the radiations from a Fade-Ometer with light, atmospheric, and heat factors under control, and which will provide the means for combining light exposure with exposure to other agencies; and (b) by discovering means of accelerating the light color-fastness test so that it will have sufficient severity to simulate use conditions, while still not requiring more time to perform than would be practical in a routine testing laboratory. This report covers only the preliminary steps in the development of a controlled, accelerated aging test involving light. The chief purpose of this study was to ascertain whether or not control and acceleration in the laboratory light color-fastness test are possible.

Cabinets which have made provision for exposure of test fabrics to the Fade-Ometer radiations under controlled conditions have been built, and have been described by Lyle *(5)*. The cabinets have made it possible for investigators to expose fabrics to light at different temperatures and in different atmospheres, to expose fabrics previously saturated with perspiration, and to combine a light treatment alternately with abrasion, laundering, or drycleaning treatments. The cabinets utilize a sufficiently large specimen of fabric to permit numerous observations for strength, shrinkage, and color change to be made following one operation or exposure condition.

This paper describes the exposure of a variety of fabrics in the aging cabinets, by combining the agencies of light in air and in an atmosphere of oxygen with heat and humidity, in an attempt to ascertain whether or not the light color-fastness test may be controlled and accelerated with the equipment already described. In addition to exposure in the aforementioned cabinets, the fabrics also were exposed to the direct light of the carbon arc of the FDAR and FDA types of Fade-Ometers for periods of 40, 60, 80, 100, 150, 200, and 300 hours, and to atmospheric conditions and to daylight through window glass for comparative purposes.

PLAN OF PROCEDURE

Experimental Fabrics

Twelve experimental fabrics were used in various parts of this investigation, as follows:

Test Fabric Number	*Description*
1.	Light blue spun viscose rayon fabric of the taffeta type, dyed with an after-treated direct dye;
2.	Light green mercerized basket weave cotton fabric, dyed with an anthraquinone vat dye;
3.	Rose spun fabric of viscose rayon and Aralac, of the challis type, dyed with a direct dye;
4.	Dark blue viscose and acetate rayon

TABLE I

Fading as Expressed in Units of Color Difference, and Strength Changes, in Cabinets Maintained at a Low Temperature and Humidity

Temperature: 100° ± 1.0° F.; Humidity: 30 ± 8 per cent.
Exposure Time: 50 hours

Test Fabrics	*Units of Color Difference*			
	Atmosphere, Air (Light)		*Atmosphere, Oxygen (Light)*	*Atmosphere, Oxygen (Darkness)*
	Cabinet I	*Cabinet II*		
(1) Blue Spun Viscose Rayon	1.5	1.4	1.8	0.0
(2) Green Cotton Basket Weave	6.7	6.2	6.2	0.6
(3) Rose Spun Aralac and Viscose Rayon	1.7	0.5	0.9	2.5
(4) Dark Blue Viscose Rayon and Acetate Alpaca	7.1	4.3	5.5	2.2
(5) Kelly Green Viscose Rayon and Acetate Romaine	3.5	3.5	2.1	0.0
	Percentage Change in Wet Bursting Strength			
(1) Blue Spun Viscose Rayon	—4.6%	—7.8%	—6.2%	7.5%
(2) Green Cotton Basket Weave*	..	..	..	..
(3) Rose Spun Aralac and Viscose	—0.6	—2.2	—5.7	1.4
(4) Dark Blue Viscose and Acetate Alpaca	—11.0	—10.5	—10.3	—2.8
(5) Kelly Green Viscose and Acetate Romaine	—0.3	—1.5	—2.3	—1.8
(6) White Cotton Muslin	—13.8	—15.3	—12.9	—1.5

* This fabric was so strong that it could not be ruptured at 200 pounds, the capacity of the Mullen Tester.

alpaca; dyed with diazotized and developed dyes;

5. Kelly green viscose and acetate rayon Romaine, dyed with direct dye;
6. White cotton muslin for checking duplicate cabinets by means of wet bursting strength measurements;
7. Blue viscose rayon gabardine of spun viscose, dyed with a direct dye;
8. Pink tricot knit fabric of cellulose acetate, dyed with direct dyes of the acetate type;
9. Red Salyna of cotton and spun viscose, dyed with diazo and developed dyes;
10. Chartreuse taffeta of cellulose acetate, dyed with a direct dye of the acetate type;
11. Blue print viscose twalle, dyed with direct, anthraquinone and thioindigoid vat dyes; and
12. Rose and gray print viscose twalle, dyed with direct and thioindigoid vat dyes.

Laboratory Methods of Test

Dye Identification

The dyes used on the fabrics under test were identified by chemical tests. The procedure essentially as given by Green *(3)* as modified by private information from C. A. Seibert of E. I. du Pont de Nemours & Co., Inc. was used. Dye tests were run both in the laboratories of the Ellen H. Richards and of the American Viscose Corporation.

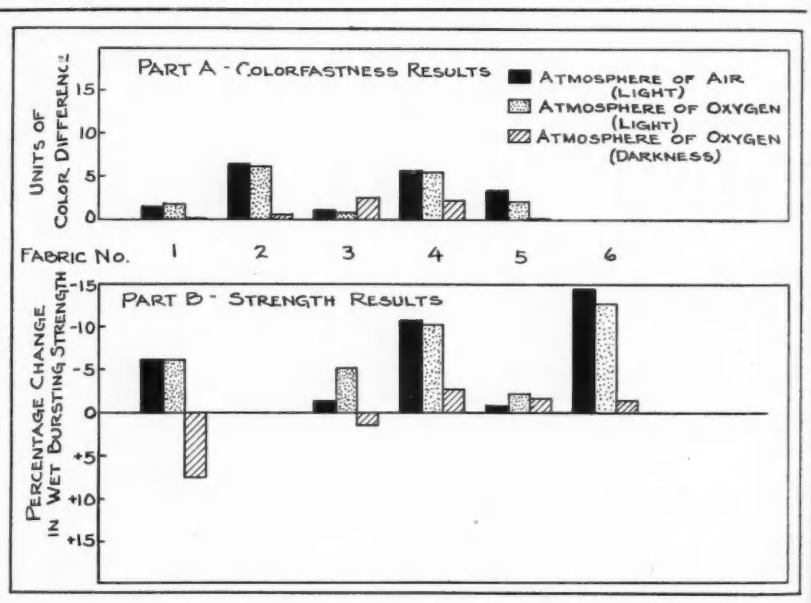


Figure 1

Exposure Cabinet Data with and without Oxygen at the Same Temperature and Humidity Conditions.

Bursting Strength Measurements

Bursting strength measurements were made by the use of the Mullen Motor-driven tester. An average of 10 bursting strength measurements was made on the specimens exposed in the cabinet and an average of eight measurements was taken upon fabrics exposed directly to the light of the Fade-Ometer.

Visual Inspection for Color Change

The fabrics were evaluated in a dark cabinet by the method described by Borton, Walker, Mack, and Seibert *(2)*. They were placed in one of four arbitrary classifications, as follows:

Class I—No visible fading.
Class II—Slight fading.
Class III—Considerable fading.
Class IV—Very severe fading.

Cards of many colors of fabrics, each faded to different degrees and classified in the Ellen H. Richards Institute according to this arbitrary scheme served to standardize the visual judgments satisfactorily.

TABLE II

Fading as Expressed in Units of Color Difference, and Strength Changes, in Cabinets Maintained at a Higher Temperature and Humidity

Temperature: 145 ± 6° F.; Relative Humidity: 45 ± 15 per cent
Exposure Time: 50 hours

Test Fabrics	Atmosphere, Air (Light)			Atmosphere, Oxygen (Light)		
	Visual Colorfastness rating	Units of Color Difference	Percentage Change in Wet Bursting Strength	Visual Colorfastness rating	Units of Color Difference	Percentage Change in Wet Bursting Strength
(1) Blue Spun Viscose Rayon.....	III	14.4	—18.2	IV	21.8	—55.8%
(2) Green Cotton Basket Weave*.....	III	4.4	..	IV	10.2	..
(3) Rose Spun Aralac and Viscose Rayon..	III	8.6	—18.2	IV	23.7	—25.4
(4) Dark Blue Viscose and Acetate Alpaca.	III	15.6	—52.8	IV	18.2	—36.8
(5) Kelly Green Viscose and Acetate Rayon Romaine	III	11.0	—10.6	IV	20.2	—12.7
(6) White Cotton Muslin.....		..	—38.0		..	—36.0
(7) Blue Viscose Gabardine.....	III	10.7	—35.7	IV	18.4	—50.3
(8) Pink Tricot Cellulose Acetate Rayon Knit Fabric	III	5.5	—14.8	IV	15.4	—27.1
(9) Red Cotton and Spun Rayon Salyna...	I	1.1	—11.7	I	1.5	—22.3
(10) Cellulose Acetate Chartreuse Taffeta...	III	6.0	—8.9	IV	7.9	—15.7
(11) Blue Viscose Rayon Twalle Print**....	III	..	—49.2	IV	..	—63.1
(12) Rose Viscose Rayon Twalle Print**....	III	..	—53.4	IV	..	—55.7

* This fabric was so strong it could not be ruptured at 200 pounds, the capacity of the Mullen Tester.
** Fading in these fabrics could be evaluated by visual inspection only, because of the design.

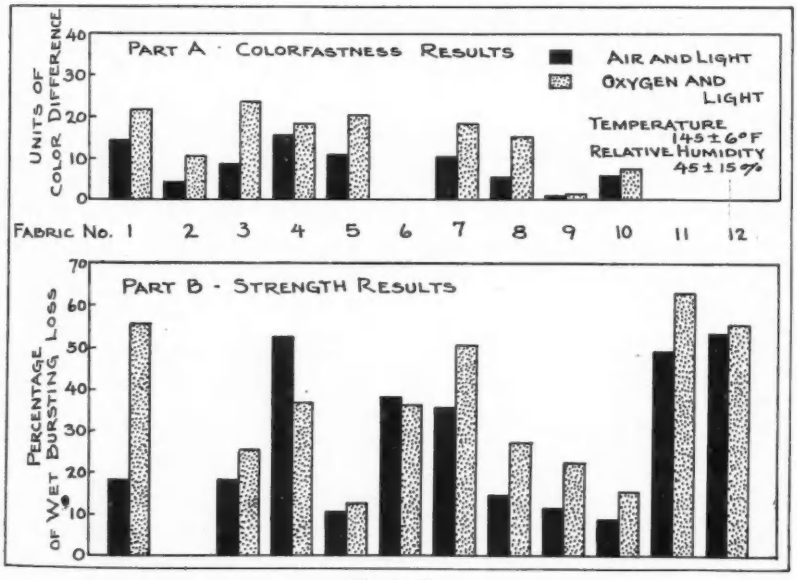


Figure 2

Exposure Cabinet Data with and without Oxygen at the Higher Temperature and Humidity Conditions.

Measurement of Color Difference

In order to determine the amount of color change in a fabric resulting from the various lengths of time and conditions of exposure under investigation, readings on the blue, amber, and green filters of the Hunter Reflectometer were taken on the original fabric and on the same fabric after exposure. Measurement of the amount of color difference was then calculated by the formula proposed by Hunter for use with this instrument *(4)*. Derivation of this formula was based on Judd's emperical equation for E, the approximate amount of perceived color difference.

Tests

Preliminary Exposures in Aging Cabinets

In order to determine the effect of the conditions of light, oxygen, and air alone and in combination upon the same textile fabrics, five rayon fabrics and one white desized cotton fabric, the latter to serve as a control on strength losses, together with a strip of Calibration Paper B, to serve as a fading control, were exposed to light under conditions of 100° F. ± 1.0 and a relative humility of 28 ± 8 per cent, for a 300-hour period, in a preliminary run; each fabric thus was exposed for 50 hours, using the exposure cabinets with the FDA Fade-Ometer.

The experimental fabrics used in this part of the study were Numbers (1) to (6). These same fabrics likewise were exposed directly to the Fade-Ometer for 50 hours for comparative purposes, and to the FDA instrument for 40, 60, 80, and 100 hours.

Results obtained from the foregoing preliminary tests showed that fading during direct exposure in the Fade-Ometer was more drastic than that in the cabinets. Hence, more severe conditions and exposure were necessary before acceleration could be accomplished. Therefore, exposures involving higher conditions of temperature and humidity, with air and

TABLE III

Summation of Data on Irradiation of Fabric Which Exhibited Good Light Color-Fastness
PINK TRICOT (KNIT)
Fiber Content: Cellulose Acetate
Dye Type: Direct

Visual Inspection Ratings

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*	*F.D.A. Fade-Ometer*	*Aging Cabinets High Temperature and Humidity Air*	*Aging Cabinets High Temperature and Humidity Oxygen*
1 month	Class II	40 hours	Class II	Class II		
3 months	Class II	60 hours	Class II	Class II		
6 months	Class II	80 hours	Class II	Class II	Class III	Class IV
		100 hours	Class II	Class II		
		150 hours	Class III	Class III		
		200 hours	Class III	Class III		
		300 hours	Class IV	Class IV		

Units of Color Difference

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*	*F.D.A. Fade-Ometer*	*Aging Cabinets High Temperature and Humidity Air*	*Aging Cabinets High Temperature and Humidity Oxygen*
1 month	13.8	40 hours	8.0	9.0		
3 months	11.5	60 hours	7.3	8.9		
6 months	6.8	80 hours	6.8	9.0	5.5	15.4
		100 hours	5.9	9.6		
		150 hours	10.4	11.9		
		200 hours	12.3	10.9		
		300 hours	17.4	13.6		

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*		*F.D.A. Fade-Ometer*		*Aging Cabinets High Temperature and Humidity Air*		*Aging Cabinets High Temperature and Humidity Oxygen*	
Pounds	*Per Cent. Change*		*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*
		40 hours	26.6	— 0.3	26.9	—13.2				
		60 hours	27.2	— 0.7	28.2	— 9.0				
6 months 25.0	—12.6	80 hours	26.6	— 2.9	27.1	—12.6	21.3	—14.8	19.4	—27.1
		100 hours	26.0	— 5.1	24.6	—17.4				
		150 hours	24.6	—10.2	25.4	—18.1				
		200 hours	23.8	—13.1	25.6	—17.4				
		300 hours	22.2	—19.0	24.3	21.6				

with oxygen were undertaken. This made it possible to judge whether or not higher losses in color and strength could be effectuated at the higher than at the lower temperatures and humidities, whether air or oxygen is more effective at these conditions, and whether the temperature and humidity conditions with one of the atmospheres, namely—oxygen caused more or less change with or without light.

For purposes of this more intensive test, all 12 experimental fabrics, representing a variety of fiber and dye types, as well as numerous fabric constructions were exposed directly to the FDAR type and the FDA type of Fade-Ometer, to atmospheric conditions and daylight for periods of one, three, and six months, and in the exposure cabinets, the latter used in conjunction with the FDA Fade-Ometer. The temperature in the exposure cabinets was 145 ± 6° F. and the relative humidity 45 ± 15 per cent.

RESULTS OF THE STUDY

The temperature and humidity levels were maintained under reasonably close control during the tests, and the two cabinets gave results which were similar to each other. See Table I.

TABLE IV

Summation of Data on Irradiation of Fabrics Which Exhibited Intermediate Light Color-Fastness

BLUE GABARDINE

Fiber Content: Warp, Viscose Rayon; Filling, Viscose Rayon Dyed Type: Direct

Visual Inspection Ratings

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*	*F.D.A. Fade-Ometer*	*Aging Cabinets High Temperature and Humidity Air*	*Aging Cabinets High Temperature and Humidity Oxygen*
1 month	Class II	40 hours	Class I	Class I		
3 months	Class II	60 hours	Class II	Class II		
6 months	Class III	80 hours	Class II	Class II		
		100 hours	Class II	Class II	Class III	Class IV
		150 hours	Class II	Class III		
		200 hours	Class III	Class III		
		300 hours	Class IV	Class IV		

Units of Color Difference

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*	*F.D.A. Fade-Ometer*	*Aging Cabinets High Temperature and Humidity Air*	*Aging Cabinets High Temperature and Humidity Oxygen*
1 month	6.4	40 hours	2.5	0.6		
3 months	5.7	60 hours	6.0	2.2		
6 months	6.5	80 hours	7.2	2.2		
		100 hours	7.1	2.7	10.7	18.4
		150 hours	7.7	3.5		
		200 hours	11.1	4.9		
		300 hours	11.5	5.8		

Wet Bursting Strength

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*		*F.D.A. Fade-Ometer*		*Aging Cabinets High Temperature and Humidity Air*		*Aging Cabinets High Temperature and Humidity Oxygen*	
Pounds	*Per Cent. Change*		*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*
		40 hours	61.8	— 4.0	55.4	— 5.3				
3 months 52.2	—13.0	60 hours	60.8	— 5.5	55.1	— 5.8				
6 months 52.8	—13.7	80 hours	59.4	— 7.8	51.1	—12.6				
		100 hours	57.2	—11.2	50.9	—13.0	36.0	—35.7	28.3	—50.3
		150 hours	56.6	—12.1	53.3	— 8.5				
		200 hours	48.6	—24.5	53.0	— 9.4				
		300 hours	50.2	—22.0	52.9	— 9.6				

Table I gives the data obtained when the first six experimental fabrics were exposed at 100 ± 1.0° F. and 30 ± 8 per cent relative humidity for 50 hours per fabric. Both the degree of fading and the loss in wet bursting strength experienced only slight changes, with no notable differences between the results obtained with air or oxygen atmospheres. When oxygen served as the atmosphere, the losses although slight were less in darkness than when light was employed. This was true both for color and strength losses.

Figure 1 gives the results graphically in air (average of the two cabinets) and in oxygen, under the conditions specified.

Table II shows the fading and strength change data for all 12 experimental fabrics used at the higher temperature and relative humidity conditions (145 ± 6° F. and 45 ± 15 per cent for temperature and humidity, respectively).

Throughout the study, light fading during 50 hours of exposure in the cabinets at 145 ± 6° F. and a relative humidity of 45 ± 15 per cent was far greater in an atmosphere of oxygen than air, except for the one highly colorfast fabric, the red cotton and spun rayon Salyna, which experienced only negligible fading in either case. Wet breaking strength losses likewise were generally more severe in the oxygen atmosphere under these conditions. Table II gives the experimental data for the 12 fabrics exposed in atmospheres of air and of oxygen at the higher temperature and humidity conditions. Figure 2 shows graphically the comparative fading and strength results with air and with oxygen

TABLE V

Summation of Data on Irradiation of Fabric Which Exhibited Poor Light Color-Fastness

Blue Twalle

Fiber Content: Warp, Viscose Rayon; Filling, Viscose Rayon

Dye Type (On least color-fast area, namely—the blue background)—Direct

Visual Inspection Ratings

Daylight through Glass under Atmospheric Conditions			*F.D.A.R. Fade-Ometer*	*F.D.A. Fade-Ometer*	*Aging Cabinets High Temperature and Humidity Air*	*Aging Cabinets High Temperature and Humidity Oxygen*
1 month	Class II	40 hours	Class II	Class II		
3 months	Class IV ←	60 hours	Class II	Class II		
6 months	Class IV ←	80 hours	Class II	Class II	→ Class III	→ Class IV
		100 hours	Class III ←	Class III		
		150 hours	→ Class IV	Class III		
		200 hours	→ Class IV	→ Class IV		
		300 hours	→ Class IV	→ Class IV		

Wet Bursting Strength

Daylight through Glass under Atmospheric Conditions				*F.D.A.R. Fade-Ometer*		*F.D.A. Fade-Ometer*		*Aging Cabinets High Temperature and Humidity Air*		*Aging Cabinets High Temperature and Humidity Oxygen*	
	Pounds	*Per Cent. Change*		*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*	*Pounds*	*Per Cent. Change*
1 month	37.4	11.3	40 hours	31.6	—11.9	32.5	— 8.7				
3 months	27.2	—19.0	60 hours	27.6	—23.3	30.0	—15.7				
6 months	23.4	—35.2 ←	80 hours	27.0	—25.0	32.6	— 8.4	19.4	—49.2	13.9	—63.1
			100 hours	27.0	—25.0	28.3	—20.5				
			150 hours	26.4	—26.6	23.4	→ —34.2				
			200 hours	18.6	→ ↑↓ —51.1	19.4	—45.5				
			300 hours	17.4	—51.7	17.5	—50.8				

at the higher temperature and humidity conditions maintained within the exposure cabinets.

Tables III, IV, and V show the comparative data obtained through daylight exposure through window glass for one, three, and six months, respectively; through exposure for various time periods to two Fade-Ometer types, and the irradiation in the exposure cabinets in air and in oxygen, with the higher temperature and relative humidity conditions, on five representative fabrics.

All fabrics gave similar results; those chosen for reproduction of the full data as a part of this report represent a fabric with good, one with intermediate, and one with poor color-fastness. With these as with all of the experimental fabrics, 50 hours in the exposure cabinet with air at the higher temperature and humidity gave results which equalled or exceeded six months of exposure to atmospheric conditions through glass, and from 100 to 300 hours of direct exposure to the same Fade-Ometer. Exposures of 50 hours in oxygen in the cabinets, under the same conditions, gave results, both in color-fastness and strength, which were more drastic than those obtained in air.

SUMMARY

The following temperature and humidity conditions were used in cabinets built to carry on light tests under controlled conditions: (1) 100 ± 1.0° F. and 30 ± 8 per cent relative humidity; and (2) 145 ± 6.0° F. and 45 ± 15 per cent relative humidity. Atmospheres of air and oxygen, respectively, were used. With the oxygen, tests were run with and without light.

Observations on fading and on wet bursting strength were used as criteria for judging the relative merits of the respective conditions as a part of the development of a controlled, accelerated test for light fading.

Twelve experimental fabrics were used in the tests involving higher temperatures and humidities; and five of these were used at the lower temperature and humidity conditions.

The results show that only slight fading and strength losses were obtained at the lower temperature and humidity, whether air or oxygen was used as the atmosphere. Oxygen generally gave slightly higher results than air; and oxygen with light gave somewhat greater losses than when the test was run in darkness, although the color and strength changes throughout were negligible.

With the 145 ± 6.0° F. temperature and a relative humidity of 45 ± 15 per cent, 50 hours of irradiation in the exposure cabinet in atmospheres of air and of oxygen were markedly accelerated, with oxygen giving the greater acceleration. It was found that 50 hours of exposure with oxygen under these higher temperature and humidity conditions equalled or exceeded the fading results with 300 hours of direct exposure with the same Fade-Ometer, or with six months of window exposure to daylight through glass together with atmospheric conditions.

The principle of a controlled, accelerated light test has been demonstrated. An investigation of the results which may be obtained with graded times of exposure under the conditions specified is in progress at the Ellen H. Richards Institute, The Pennsylvania State College.

(Concluded on Page 282)

Testing of Fungicidal Materials Against Pathogenic Fungi*

LOUIS C. BARAIL, M. D.

United States Testing Company, Inc.

THERE is no doubt that the War has made germ-conscious and fungus-conscious a great many people who previously failed to realize the importance of microbial contamination in everyday life. Except for a few individuals who were bound to deal with bacteria and fungi in some way or other, the public at large before the War generally considered the existence of germs and fungi as a fact of little interest. At that time, when the press carried news about epidemics caused by bacteria such as diphtheria, by viruses such as infantile paralysis or by fungi such as tinea capitis, the danger of contamination was often forgotten before the end of the epidemics.

At the end of World War II, however, we noticed less indifference in many professions and trades and it is logical to believe that this was mainly due to the coming home of our armed forces bringing with them information gathered in the various theatres of operations. Their interest in bacteriology was great enough in many cases to comprise not only the most common pathogenic bacteria and fungi and the pathological disturbances that are attributed to them but also non-pathogenic fungi and their action on fabrics, equipment and various materials of all kinds.

Never in the history of bacteriology have we been asked to test against bacteria and fungi as great a variety of materials to determine their protective value against micro-organisms. These requests started to come in greater numbers after V-J Day from manufacturers of hosiery, underwear, shoe linings, hat bands, hat linings, paints, etc., and also manufacturers of fungicides. A very interesting fact is that the test organisms are no more those used during the War which were non-pathogenic and merely destroyed fabrics or plastics. They are now pathogenic bacteria or fungi and in the greatest number of cases, the samples have to be tested against one or several of the fungi causing dermatophytosis. Manufacturers of hosiery, underwear, shoe linings want to treat their fabrics in such a way that they will help in preventing contamination by such organisms as Trichophyton gypseum, Trichophyton purpureum, Epidermophyton inguinale, Microsporum lanosum or others. Manufacturers of hat bands or hat linings want to find out if properly treated leather or fabrics will have any effect in the prevention of contamination by microsporum audouini or any fungus of the Trichophyton group. Manufacturers of paints are now very anxious to know to what extent bactericidal and fungicidal paints will kill by contact airborne bacteria in hospital rooms or food processing plants or prevent the contamination by dermatophytosis organisms in swimming pools, bathrooms, gymnasiums and other such public places.

The Government's and other more or less official publications do not describe any standard methods agreed upon by a great majority of bacteriologists for the testing of such materials against pathogenic fungi. It was necessary to conduct a great number of comparison tests of the already existing methods and also to devise new procedures in order to obtain a satisfactory method that could be accepted by other bacteriologists for its reproducible results, and accuracy. As a factor very important in industrial bacteriology it also was desirable that such results be obtained in as little time as possible. In this paper we will describe methods for the testing of practically all kinds of materials for fungistatic and fungicidal properties against pathogenic fungi.

I. Selection of Organisms

A great many pathogenic fungi can be used as test organisms and their number and their variety are so great that the use of all of them under normal conditions would be practically impossible. For this reason we found it desirable at the start of our investigation, to limit our test organisms to a list comprising the most common, frequent and widely known of all pathogenic species of fungi. Our selection comprises:

(1) nine organisms of the Trichophyton group as follows:

Trichophyton gypseum,
Trichophyton purpureum,
Trichophyton violaceum,
Trichophyton sulfureum,
Trichophyton interdigitale,
Trichophyton ferrugineum,
Trichophyton Sabouraudi,
Trichophyton flavum,
Trichophyton crateriforme

(2) four microspora:
Microsporum Audouini,
Microsporum lanosum,
Microsporum fulvum,
Microsporum furfur

(3) two members of the Achorion group:
Achorion Schoenleini, and
Achorion gallinae

(4) we have added:
Epidermophyton inguinale,
Endodermophyton tropicale,
Monilia albicans

Out of this list five organisms are more frequently used than all the others. They are Trichophyton gypseum, Trichophyton purpureum, Trichophyton sulfureum, microsporum Audouini and Epidermophyton inguinale, which are found in the great majority of all dermatophytosis cases of the feet, body and scalp.

These organisms are either used individually or preferably in mixed cultures. Such mixed cultures can comprise two of three organisms, sometimes a greater number.

II. Controls

Needless to say, we use as a control in all our tests a sample of untreated material whenever possible. We believe that it is absolutely necessary because it is the only way of having a correct picture of ordinary contaminating conditions of the untreated material and it also enables us to check the growth of our test organisms in various media and on the various samples of materials submitted to the tests. Besides plating untreated controls against pathogenic organisms, we find it worthwhile to make comparison tests against non-pathogenic fungi because of the numerous data we have gathered from our experience on such fungi during the War. These fungi are selected for their specific resistance against fungicides when they are tested on their most suitable fabric material or media. Such resistance has

* A paper presented at the meeting of the New York Branch of the Society of American Bacteriologists on October 22 1946.

been established by specialized laboratories all over the country during the war. For instance, when a single culture is used we plate samples of leather against Rhizopus nigricans, samples of cotton or other vegetable fibers against Chaetomium globosum, Aspergillus niger or Metarrhizium glutinosum, samples of wool, Aralac or silk against Penicillium digitatum or Aspergillus niger, samples of nylon against Aspergillus niger or Metarrhizium glutinosum, samples of paints, plastics, lacquers, and other protective materials against Aspergillus niger or Rhizopus nigricans. As the degree of comparative resistance of these organisms has been determined by thousands of tests conducted against scores of fungicides, such tests give us a very useful information which in the case of Aspergillus niger or Rhizopus nigricans is also quickly obtained.

III. Semi-Permanency

One of the most important characteristics of these tests is that they are always conducted to obtain information as to the retention of the fungicides in the materials and the semi-permanency of their fungicidal properties. Consequently, fabrics will not only be tested as received but also subjected to a great number of hand washings or launderings or mere soakings or leachings. Paints will be subjected to long leachings or to accelerated aging tests such as those conducted in the Weather-Ometer. This apparatus in which the samples are subjected to ultraviolet light, reproducing sunlight, and showers, reproducing rain, gives painted samples in a few days the same aging as that obtained in several months under normal conditions. Very often the fabrics are submitted to contaminating agents. For instance, diapers may be recontaminated between launderings with urine, feces, or perspiration. Underwear fabrics, hosiery, hat bands, or hat linings can be submitted to perspiration to which suspensions of fungi may be added. Similar tests to those performed on the sample as received are run on all samples after these numerous washings, launderings, aging tests and recontaminations.

IV. Fungistatic Tests

Although fungistatic tests give only a relative value of the efficiency of a fungicide we believe they are necessary and consequently all compounds are always tested for fungistatic properties. The results should always be interpreted from two angles: as they are conducted the same way as the bacteriostatic tests (F.D.A. Method), they only indicate the diffusion of the sample in the agar. Therefore, this diffusion shall be studied in reference to both the diffusibility of the compound when incorporated in the material and the actual inhibitory or fungistatic value of the same compound. The samples are plated on Sabouraud maltose agar *previously* planted or inoculated with one or several pathogenic fungi. As controls, samples of the untreated material are plated under the same conditions and samples of treated material are also plated against a non-pathogenic fungus as explained before. The Petri dishes are examined after a reasonable time. The minimum incubation time will be that required to obtain a full growth of the culture and will vary with the species and the temperature, provided the medium remains the same.

Examination after this minimum period of time will give an indication but will not be sufficient. It very often happens that a compound diffuses quickly and widely on the surface of the agar so that within a few days a wide zone of inhibition is obtained. Then, a few days later and because of the diffusibility of the compound, the sample does not contain enough of it to prevent a secondary growth inside the zone of inhibition. It is absolutely necessary to make this second observation of the plates from five to eight days after the end of the minimum incubation period showing full growth of the organism. The comparative study of the diffusibility and of the actual fungistatic properties as indicated by the width of the zone of inhibition and the presence or absence of a secondary zone of growth is of great value when for instance knitted fabrics are concerned, principally hosiery.

Most hosiery manufacturers have the tendency of asking too much from treated hose and do not realize that *fungistatic* hosiery could be only efficient if it would be given the shape of gloves, whereby the treated fabric would come in contact with the skin between the toes. The fungistasis of hosiery is of no value when the hose is not strongly *fungicidal.*

V. Fungistatic and Fungus-Resistance Tests After Inoculation of the Material

These tests are more severe and of a greater informative value than simple fungistatic tests. They actually indicate not only whether or not a material will inhibit the growth of fungi placed next to it in a nutrient media, but also whether or not mold growth will occur on the material after direct inoculation, giving the mold the material itself as only food.

The test consists of plating the samples in a Petri dish containing Sabouraud's agar, planted or not with the test fungus, and to inoculate the top of the material with a suspension of the same organism. At the end of the adequate incubation period, the plates are observed, both for inhibition, indicating fungistasis, and for the presence or absence of growth on top of the sample.

VI. Fungicidal Tests

There are three ways of evaluating the fungicidal value of treated materials against pathogenic fungi. The first two methods are a little empirical but simple, time saving and correctly informative. The third method always gives reproducible and accurate results and will be studied later.

The first method consisted in taking a loopful from the plate used in the fungistatic test as accurately as possible halfway between the edge of the sample and the edge of the inhibition zone. The loopful is then planted in another plate on Sabouraud's agar or in broth and incubated until growth appears in the control. The control will be a loopful of an agar plate or slant of a fresh standard culture of the same organism and will be plated under exactly the same conditions either on agar or in broth. Growth in the subculture from the fungistatic plate will indicate that the compound is fungistatic but not fungicidal. If no growth occurs in the subculture, at a time when the control will show growth it will be wise to keep the sample in incubation for a few more days to be sure that the subculture will be given all chance to grow under the best conditions.

We have found that very often samples treated with a compound having a great diffusibility do not possess any fungicidal properties. The best results in this test are obtained with samples showing a medium size zone of inhibition and no secondary growth within it. On the other hand, it is obviously not advisable to make a fungicidal test on samples showing too small an inhibition against pathogenic fungi.

VII. Fungicidal Tests After Inoculation of the Material

It is easy to determine the fungicidal value of a sample of material after inoculation. The procedure consists of sampling from the top of the material at the end of the required incubation period, when no growth is present on the sample. Sampling can be made with a dry or wet loop or wet sterile cotton, and the transfer is made either on a slant or in a dish, on Sabouraud's agar.

After the adequate period of inhibition, the tubes or plates are examined for the presence of growth.

This method is very simple and satisfactory in a great number of cases. How-

(Continued on Page 281)

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1948, American Association of Textile Chemists and Colorists

APRIL 19, 1948

National Officers of the Association

President
HENRY F. HERRMANN
General Dyestuff Corp., 435 Hudson Street, New York 14, N. Y.

Vice-Presidents
C. NORRIS RABOLD
Union Bleachery, Greenville, S. C.
JOHN N. DALTON
Pacific Mills, Lawrence, Mass.

Treasurer
WILLIAM R. MOORHOUSE
National Aniline Division, Allied Chemical & Dye Corp., 150 Causeway Street, Boston 14, Mass.

Secretary
HAROLD C. CHAPIN
Lowell Textile Institute, Lowell, Mass.

President Emeritus
LOUIS A. OLNEY
Lowell Textile Institute, Lowell, Mass.

Chairman of the Research Committee
J. ROBERT BONNAR
General Dyestuff Corp., 435 Hudson Street, New York 14, N. Y.

Director of Research
HAROLD W. STIEGLER
Lowell Textile Institute, Lowell, Mass.

COUNCILORS
Representing Sections

Rhode Island: GEORGE H. WOOD, JR., HAROLD B. STURTEVANT, RALPH F. CULVER.
Philadelphia: CURT R. BAERINGER, LLOYD O. KOONS, ARTHUR W. ETCHELLS, WALTER F. FANCOURT, 3rd, PERCIVAL THEEL.
New York: GEORGE L. BAXTER, EMMETT J. DRISCOLL, WINN W. CHASE, WILLIAM A. HOLST, FRANCIS S. RICHARDSON, CHARLES W. DORN.
Northern New England: WALTER J. HAMBURGER, DAVID X. KLEIN, C. WENDALL LEVER.
Piedmont: SIDNEY M. CONE, WYSS L. BARKER, LELAND G. ATKINS.
Southeastern: WILLIAM B. GRIFFIN.
South Central: JACK ANDERSON.
Mid-West: ERIC W. CAMP, SAMUEL KLEIN.

Past Presidents

ELVIN H. KILLHEFFER, P. J. WOOD, WILLIAM H. CADY, ALBAN EAVENSON, CARL Z. DRAVES, THOMAS R. SMITH, WILLIAM D. APPEL.

Standing Committees of the Council and their Chairmen

Executive Committee on Research
J. Robert Bonnar, Chairman

Publicity
Winn W. Chase, Chairman

Conventions
Kenneth H. Barnard, Chairman

Appropriations
William R. Moorhouse, Chairman

Constitution and By Laws
Harold C. Chapin, Chairman

Membership and Local Sections
John N. Dalton, Chairman

Corporate Membership
Emmett J. Driscoll, Chairman

Publications
Louis A. Olney, Chairman

Technical Programs
Miles A. Dahlen, Chairman

Local Sections and their Officers

Northern New England Section

Chairman
George O. Linberg, Monsanto Chemical Co., 140 Federal Street, Boston 5, Mass.

Secretary
Azel W. Mack, Dexter Chemical Corp., 581 Boylston Street, Boston 16, Mass.

Vice-Chairman: Frank J. O'Neil
Treasurer: Martin H. Gurley, Jr.

Rhode Island Section

Chairman
Raymond W. Jacoby, Ciba Co., Inc., 61 Peck Street, Providence 1, R. I.

Secretary
Emory A. Richards, Airedale Worsted Mills, Inc., 1 Main Street, Woonsocket, R. I.

Vice-Chairman: Robert W. Joerger
Treasurer: Robert R. Farwell

New York Section

Chairman
Herman E. Hager, General Dyestuff Corp., 435 Hudson Street, New York 14, N. Y.

Secretary
Norman A. Johnson, American Dyestuff Reporter One Madison Ave., New York 10, N. Y.

Vice-Chairman: Charles W. Dorn
Treasurer: John H. Hennessey

Philadelphia Section

Chairman
Arthur M. Gordon, Martin Fabrics Corp., Allegheny Ave. and Boudinot St., Philadelphia 34, Pa.

Secretary
Thomas H. Hart, Hart Products Corp., P.O. Box 5020, Philadelphia 11, Pa.

Vice-Chairman: James Dixon
Treasurer: A. E. Raimo

Piedmont Section

Chairman
John B. Neely, Burlington Mills, Burlington, N. C.

Secretary
Robert H. Smith, Melrose Hosiery Mills, High Point, N. C.

Vice-Chairman: Pelham Eugene Smith
Treasurer: Edwin A. Briggs

South Central Section

Chairman
Raymond B. Seymour, Industrial Research Institute, University of Chattanooga, Chattanooga 3, Tenn.

Secretary
Howard P. Loveless, Crystal Springs Bleachery, Chickamauga, Ga.

Vice-Chairman: J. Albert Crumley
Treasurer: Charles Gordon

Mid-West Section

Chairman
Joseph H. Jones, Phoenix Dye Works, 1963 Southport Ave., Chicago 14, Ill.

Secretary
William Boyd, Jr., Ciba Co., Inc., 325 W. Huron St., Chicago 10, Ill.

Vice-Chairman: Elliott Morrill
Treasurer: Edward Larson

Southeastern Section

Chairman
C. Russell Gill, Southern Sizing Co., P.O. Box 167, Atlanta, Ga.

Secretary
S. Jack Davis, Callaway Mills, LaGrange, Ga.

Vice-Chairman: Howard M. Waddle
Treasurer: W. F. Crayton

Student Chapters

Lowell Textile Institute
North Carolina State College
Philadelphia Textile Institute
New Bedford Textile Institute
Georgia School of Technology
Clemson College
Bradford Durfee Technical Institute

Members should notify the Secretary immediately of all address changes

Membership Applications

SENIOR

G. B. F. Adam—Sr. Home Economist, General Electric Co., Bridgeport, Conn. Sponsors: M. Harris, L. Fourt.

J. Vaughn Boone—Salesman, Geigy Co., Inc., Charlotte, N. C. Sponsors: F. E. Sprock, W. S. Sims.

Robert C. Carr—Textile Colorist, Ciba Co., Inc., Philadelphia, Pa. Sponsors: E. W. Brenner, F. E. Nevins.

E. C. Coker—In Charge of Lab., The Mt. Vernon Woodberry Mills, Inc., Tallassee, Ala. Sponsors: C. R. Gill, O. W. Simmons.

Edgar T. Corbitt—Augusta Chemical Co., Augusta, Ga. Sponsors: L. E. Whittelsey, S. J. Davis.

Lowell T. Crews—Research Chemist, Armour & Co., Chicago, Ill. Sponsors: L. J. Armstrong, W. Boyd, Jr.

W. Rodman Derr—Mgr., The Columbia Mills, Inc., Wilkes-Barre, Pa. Sponsors: E. C. Diehl, T. H. Hart.

Albert M. Elias—Yarn Consultant & Purchaser, Shah Navinchandra Bhogilal, Bombay, India. Sponsors: H. E. Hager, O. F. Marks.

Cemal Ergin—Director Tech. Dept., ASTAS (Rep. du Pont Co., Turkey), Istanbul, Turkey. Sponsors: C. A. Seibert, J. W. Killheffer.

Robert K. Federal—Sales & Technical Repres., General Dyestuff Corp., Charlotte, N. C. Sponsors: S. H. Williams, J. C. White.

John G. Ferguson—Dyer in Charge, Arthur Bone, Inc., Los Angeles, Calif. Sponsors: L. G. Girling, F. L. Wilhelm.

Florence M. Gardiner—Purchasing Agent, Shamokin Dye & Print Works, Inc., Shamokin, Pa. Sponsors: J. Dixon, A. E. Raimo.

Nathaniel J. Glade—Textile Technician, American Cyanamid Co., Stamford, Conn. Sponsors: J. E. Lynn, J. M. Hood.

James Gould—Mgr., Copland Converting and Finishing Co., Burlington, N. C. Sponsors: L. Proctor, A. Malick.

A. Beekman Hilton—Dyer, Abbeville Mills Corp., Abbeville, S. C. Sponsors: D. P. Knowland, W. L. Barker.

Richard M. Hoyt—Chemical Sales, Solvay Sales Div., A. C. & D. Corp., Charlotte, N. C. Sponsors: W. L. Barker, H. W. Causey.

Robert H. Keating, Sr.—Dir. of Lab., The Plymouth Company, East Boston, Mass. Sponsors: H. M. Hartnett, J. T. Allen.

Kenneth B. King—Salesman, Philadelphia Quartz Co., Philadelphia, Pa. Sponsors: T. R. Smith, F. H. Bell.

Albert Leitstein—Gen. Mgr. Featured Fabric Finishes, Warwick Chem. Co., Div. Sun Chem. Corp., New York, N. Y. Sponsors: I. S. Hurd, H. B. Goldstein.

Eli Lurie—Owner, Los Angeles Piece Dye Works, Los Angeles, Calif. Sponsors: S. Springer, F. P. Brennan.

Ralph B. Miller—Technical Repres., Corn Products Sales Co., South Boston, Mass. Sponsors: R. E. Carrigan, E. W. Lawrence.

John C. Moessinger—Mgr. Process Development Dept., General Aniline & Film Corp., Rensselaer, N. Y. Sponsors: A. E. Herrmann, Jr., H. E. Hager.

Cecil J. Naegele—Div. Supt., J. L. Stifel & Sons, Inc., Wheeling, West Virginia. Sponsors: W. F. Stifel, T. H. Walker.

Stephen J. Nanasy—Supt. of Plant, Supreme Textile Printers Inc., Long Island City, N. Y. Sponsors: L. Seltenwirth, W. F. Lauer.

Arthur S. Nyquist—Chemist, American Cyanamid Co., Stamford, Conn. Sponsors: E. A. Schuman, J. E. Lynn.

Joseph F. Oliver—Chemist & Mgr., Stoghill & Company, Atlanta, Ga. Sponsors: F. T. Lense, Jr., S. J. Davis.

James W. Patterson—Head Dyer, Tennessee Hosiery Mills Co., Englewood, Tennessee. Sponsors: E. V. Helms, H. P. Loveless, Jr.

Thomas A. Pickup—Bleacher, Lanett Bleachery & Dye Works, Lanett, Alabama. Sponsors: J. R. Hopkins, L. L. Bamberger.

Mary L. Rollins—Fiber Microscopist, Southern Regional Research Lab., New Orleans, La. Sponsors: W. D. Appel, C. W. Dorn.

Heny J. Salese—Dyeing Supt., Jersey Hat Company, Newark, N. J. Sponsors: W. Ferrazano, R. F. Holoch.

Norman E. Shobet—President, Amerasia Trading Co., Inc., New York City, N. Y. Sponsors: O. F. Marks, H. E. Hager.

Philip H. Slaughter—President, Waverly Textiles, Inc., Waverly Hall, Georgia. Sponsors: R. L. Horney, A. K. Haynes.

Chester U. Stevens—Research Chemist, Lincoln Bleachery & Dye Works, Lonsdale, R. I. Sponsors: G. M. Gantz, J. J. Roarke.

Eugene J. Takach—Purch. Agent & Salesman, Plymouth Company, East Boston, Mass. Sponsors: H. M. Hartnett, J. T. Allen.

Jacob C. Thissen, Jr.—Supt. of Dyeing, Double Woven Corp. of America, Dunmore, Pa. Sponsors: W. O. Neeb, T. H. Hart.

Emilio J. Troianello—Chemist, American Cyanamid Co., New York City, N. Y. Sponsors: J. E. Lynn, J. M. Hood.

William A. Turner—Supt. of Dyeing, American Textile Co., Inc., Pawtucket, R. I. Sponsors: J. A. Harley, R. F. Culver.

Emil A. Vitalis—Chemist, American Cyanamid Co., Stamford, Conn. Sponsors: J. E. Lynn, J. M. Hood.

George B. Willgeroth—Partner, Chemical Products Company, Aurora, Ill. Sponsors: P. F. Willgeroth, F. M. Bonnett.

Paul B. Willgeroth—Partner, Chemical Products Company, Aurora, Illinois. Sponsors: P. F. Willgeroth, F. M. Bonnett.

Frederic H. Winter—Textile Chemist, Manhattan Yarn Dyeing & Bleaching Works, Inc., Brooklyn, N. Y. Sponsors: N. F. Mellin, W. W. Barre.

Dwight A. Zink—Supt. of Dyeing, Baxter, Kelly & Faust, Philadelphia, Pa. Sponsors: J. Wauters, W. O. Neeb.

JUNIOR

Willie L. Aston, Jr.—Asst. Chemist, Fairforest Finishing Co., Spartanburg, S. C. Sponsors: J. J. Huskey, J. C. King.

William V. Bagley—Lab. Asst., Pepperell Mfr. Co., Finishing Division, Pepperell, Ala. Sponsors: R. W. Price, C. B. Ray.

Robert H. Johnson—Textile Colorist & Chemist, Industrial Dyestuff Co., East Providence, R. I. Sponsors: H. F. Kilguss, W. M. Thornton.

Herbert W. McNulty—Textile Chemist, U. S. Industrial Chemicals, Inc., Newark, N. J. Sponsors: H. E. Hager, J. R. Bonnar.

Philip W. Oppenheimer—Chemist, The Aktivin Division, Heyden Chemical Corp., New York, N. Y. Sponsors: A. R. Wachter, W. D. Baird.

James J. Schweitzer—Lab. Asst., Ciba Company, Inc., Philadelphia, Pa. Sponsors: A. E. Bride, E. W. Brenner.

Joseph M. Welsh—Textile Lab., American Aniline Products, Inc., Philadelphia 7, Pa. Sponsors: P. Theel, A. H. Seitz.

Ross S. Wharton—Apprentice Dyer, Fair Lawn Finishing Company, Fair Lawn, N. J. Sponsors: F. Tscheulin, W. G. Helmus.

ASSOCIATE

Ira D. Arnold—Supt. Dyeing & Bleachery, The Appleton Co., Anderson, S. C.

Charles W. Bowden, Jr.—Sales Engineer, The Brown Instrument Co., Philadelphia, Pa.

Burton F. Braun—Asst. Vice Pres., Nyanza Color & Chemical Co., Inc., New York, N. Y.

Irene D. Brown—Chge. of Chemical-Pharmaceutical Div., American M. O. T., Inc., New York, N. Y.

Hugh K. Goerner—Salesman, Emkay Chemical Co., Elizabeth, N. J.

Martha Johnson—Mgr. Food Research & Appliance Testing Labs., General Electric Co., Bridgeport, Conn.

Yung L. Lee—Owner, Zung Tai Dyes Co., Shanghai, China.

Emilio Lotfi—Technical Service, Industrias Quimicas Brasileiras "DUPERIAL" S.A., Sao Paulo, Brazil.

Gino Pneroni—Techanical Director, Society for the Italian Chem. Industry, Inc., Milan, Italy.

Harvey M. Rose—Salesman, Southern State Chemical Co., Atlanta, Ga.

Theodor Schetty—President, Schetty Bros. Co., Carlstadt, N. J.

Frederik Thrane—Importer of dyestuff & auxiliaries, Oslo, Norway.

Joe P. Thurman—District Mgr., The Girdler Corp., Atlanta, Ga.

STUDENT

James H. Ellis, Jr.—Georgia School of Technology. Sponsor: C. A. Jones.

Ira T. Layfield—Georgia School of Technology. Sponsor: C. A. Jones.

Richard S. Sappington—Georgia School of Technology. Sponsor: C. A. Jones.

Conrad G. Fleisher—Lowell Textile Institute. Sponsor: E. E. Fickett.

James M. O'Flahavan—Lowell Textile Institute. Sponsor: E. E. Fickett.

Jay L. Maltese—Philadelphia Textile Institute. Sponsor. P. Theel.

Frank R. Padula—Philadelphia Textile Institute. Sponsor: P. Theel.

John L. Jerome—North Carolina State College. Sponsor: A. H. Grimshaw.

S. Martin Billett—Massachusetts Institute of Technology. Sponsor: E. R. Schwarz.

CORPORATE

Bates Manufacturing Co. — Lewiston, Maine.

Applications for
TRANSFER TO SENIOR MEMBERSHIP
John Linton, III, Jose Toledo, Robert E. Willett.

—♦ ♦—

Membership Applications

SENIOR

James L. Costello—Colorist, Cherokee Finishing Co., Gaffney, S. C. Sponsors: J. van Praagh, W. L. Barker.

Thomas C. Drew—Dir. of Research & Development, Beaumont Mfg. Co., Spartanburg, S. C. Sponsors: J. van Praagh, W. L. Barker.

Palo A. Peirce—Quality Supervisor, Botany Mills, Inc., Passaic, N. J. Sponsors: P. Otto, H. Ehrhardt.

Marvin M. Pollard—Lab. Technician, Callaway Mills, HDV Div., La Grange, Ga. Sponsors: A. W. Picken, J. L. Littlefield.

JUNIOR

Carl R. Neal—Lab. Technician, Burlington Mills Corp., Burlington, N. C. Sponsors: W. L. Triplett, C. Hooper.

STUDENT

Harold S. Kalpakgian—New Bedford Textile Institute. Sponsor: F. Tripp.

James R. Nisbet—New Bedford Textile Institute. Sponsor: F. Tripp.

—♦ ♦—

Colour Index

IT is improbable that the new Colour Index, on which the American Association of Textile Chemists and Colorists is collaborating, will be out within three years. To fill current needs the British Society of Dyers and Colourists published replicas of the Index dated 1924, and Supplement dated 1928. An allotment to the Association was sold for the most part without advertising. There remain fourteen sets, available from the Secretary, AATCC, P. O. Box 28, Lowell, Mass., at $28 each, postpaid in this country. Orders will be filled in the sequence of their receipt, with preference to ultimate users rather than book dealers.

—♦ ♦—

February Meeting, R. I. Section

THE February meeting of the Rhode Island Section, was a dinner meeting held February 27th at Johnson's in Providence, Rhode Island. This meeting was known as manager's night.

Photo by Kenneth C. Everett

John Hutton (left) and W. Allen Traver, who were the speakers at the February meeting of the Rhode Island Section.

The speakers were:

W. Allen Traver, President & Gen'l Manager of the Franklin Process Co.

John Hutton, President & Gen'l Manager of the Glenlyon Print Works.

These gentlemen discussed mill conditions and the future of the textile industry. Approximately 300 members and guests were present.

Respectfully submitted,
E. A. Richards, *Secretary.*

—♦ ♦—

March Meeting, R. I. Section

THE March meeting of the Rhode Island Section was held on Friday the 26th in the Engineer's Hall with approximately 175 present.

A short business meeting preceded the speaking program.

It was moved, seconded and unanimously voted to sponsor the 1950 National Convention to be held on October 19th, 20th, and 21st.

Reports by R. Joerger and T. Larson were made on the April dinner meeting.

The speakers and papers delivered were as follows:

"A Woolen Mill Dyehouse"—Eric Appeltofft, Wanskuck Co.

"The Dyeing of Woolen Fibers & Fabrics with Vat Colors"—Gustav Hug, E. I. DuPont Co.

Respectfully submitted,
E. A. Richards, *Secretary.*

CALENDAR

PHILADELPHIA SECTION
Meetings: May 14 (Kluger's, Philadelphia); Outing: June 11 (Atlantic City Country Club, Northfield, N. J.)

MID-WEST SECTION
Meeting: May 1 (Hotel Schroeder, Milwaukee, Wis.).

NEW YORK SECTION
Meeting: May 7 (Swiss Chalet, Rochelle Park, N. J.); Outing: June 25 (North Jersey Country Club).

PIEDMONT SECTION
Meeting: June 18 (Ocean Forest Hotel, Myrtle Beach, S. C.).

NORTHERN NEW ENGLAND SECTION
Meetings: May 21, June 11 (Outing); September 24 (Andover Country Club); November 19.

SOUTHEASTERN SECTION
Meetings: July 24 (Atlanta, Ga.); September 25 (Columbus, Ga.); December 4 (Atlanta, Ga.).

SUB-COMMITTEES
Meeting: June 7 (Hotel New Yorker, New York).

COUNCIL
Meeting: June 8 (Hotel New Yorker, New York).

RESEARCH COMMITTEE
Meeting: June 8 (Hotel New Yorker, New York).

Third Report Technical Committee of the Textile Section New York Board of Trade, Inc.

March 17, 1948

Excerpts from the above report:

"Very few textile executives, especially top executives, unless they are technicians, realize the broad scope of the important research projects conducted by the excellent committees of the American Association of Textile Chemists and Colorists."

"Recognizing the value of personal conferences and face to face discussion on research projects, the AATCC introduced the new policy of setting-up research committees as a whole within individual sections covering some subject of particular interest to that Section. This method reduces traveling expenses, time and inconvenience and makes frequent meetings as the project might require, possible. The organization at the Chicago meeting of the three committeees on shrinkage of wool products and garments, is an excellent example."

"Top executives of the Textile Section of the New York Board of Trade will do well to watch the research results coming from the Committee work of AATCC and to encourage the technically qualified members of their staffs to become members and take an active part in the valuable activities of the Association."

—♦ ♦—

Meeting, Western New England Section

THE second meeting of the Western New England Section was held at Rapp's Restaurant in Shelton, Connecticut on Friday, April 2nd. Dr. Milton Harris, President of Harris Research Laboratories of Washington, D. C., delivered a paper "Functional Fiber Properties" to a group of 93 members and guests. His talk was directed mainly to the influence of chemical constitution of natural and synthetic fibers on their physical behavior, and was very well received.

Officers for the year 1948-1949 were also elected at this meeting. Those who will serve during the first year of this Section's activities are as follows:

Chairman, J. Edward Lynn
Vice Chairman, R. J. Carey
Secretary, Edward A. Murray
Treasurer, R. N. Brownlee
Councilor, H. H. Taylor
Sectional Committee, O. Edelstein, S. Vaniotis, J. M. Hood, J. F. Melody.

Respectfully submitted,
Edward A. Murray, *Secretary*

Meeting, New York Section

THE last meeting of the New York Section was held on March 12th at the Hotel New Yorker, New York City. An informal dinner preceded the meeting.

The technical program consisted of the following papers:

"Selection of Dyes and Dye Procedures for Viscose Rayon Cake Dyeing" by J. A. Woodruff, Textile Research Dept., Textile Development Laboratories, American Viscose Corp.

"Vat Dyeing of Viscose Cakes" by John Boulton, Research Director, Cortauld's Ltd., Droylsden, England.

"Some Factors in the Dyeing of Fur Felt Hats" by Dr. Harold H. Tucker, Research Consultant to the fur and hat industry. Dr. Tucker's paper was preceded by the showing of a colored sound movie on hat manufacturing prepared by the Frank H. Lee Company.

The attendance was about 250.

Respectfully submitted,
Norman A. Johnson, *Secretary*

—♦ ♦—

Meeting, Philadelphia Section

A MEETING of the Philadelphia Section was held on April 9th at Kugler's Restaurant in Philadelphia.

A. W. Etchells, of Hellwig Dyeing Corp., Chairman of the Sectional Research Committee, outlined the program of his group which will include problems of the wet processing of hosiery. All concerns in this area will be asked to cooperate.

W. O. Neeb of Geigy Co. reported 11 new members since our last meeting. John W. Jordan of Alco Oil & Chemical Corp. announced plans for our Annual Outing at the Atlantic City Country Club on June 11th.

Virgil T. Hartquist, Jefferies Dyeing Wks., Chester, Pa., spoke on "Hosiery Dyeing and Finishing" before 310 members and guests. Later a panel of experts answered questions from the floor. They were Edwin A. Demuth of Gotham Hosiery Co., Phila.; William G. Knerr, Liberty Dye Wks., Reading, Pa.; Dr. Joseph Schmitz, Jr., Universal Dye Wks., Phila.; Joseph L. Wauters, Bailey Dye Wks., Phila., and Mr. Hartquist. This part of the program was under the direction of M. H. Klein of Sandoz Chemical Wks.

The dinner preceding the meeting was attended by 286 members and guests. Arthur M. Gordon, Martin Fabrics Corp., Phila., presided at this meeting which was the largest in the history of the Section.

Respectfully submitted,
Thomas H. Hart, *Secretary*

Philadelphia Textile Institute Student Chapter

ON March 4, 1948, Jules Devigne of the Interchemical Corporation addressed the Philadelphia Textile Institute Student Chapter on pigment printing and dyeing. Dino Cimma demonstrated the preparation of pigment emulsions and their use in textile printing.

On March 18, William Baird of American Aniline Products, Inc., spoke on the application of Azo dyes.

Respectfully submitted,
Doris Mae McAllister, *Secretary.*

EMPLOYMENT REGISTER

This column is open for four insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

48-2

Education: B.S., R. I. State College.
Experience: General chemical and testing; laboratory and plant development of methods for applying dyes and textile specialties.
Age 37; married; references.

48-3

Education: B.S., with graduate work; fair knowledge of languages.
Experience: Textile chemical research, cotton dyeing, printing and finishing.
Age 26; woman, unmarried; references; vicinity of New York or Philadelphia preferred.

48-4

Education: Graduate, Philadelphia Textile Institute.
Experience: Testing dyes, etc.; chief chemist, in charge of mercerizing, bleaching and dye formulas.
Age 47; married; references; vicinity of Philadelphia preferred.

48-5

Education: B.T.C., Lowell Textile Institute.
Experience: Textile chemist and dyer, wool and cotton.
Age 40; married; references; will work anywhere in U. S.

All correspondence concerning the Employment Register should be directed to the Secretary

Review of the German Technical Reports*

THOMAS R. SMITH

Wiscassett Mills Co.

IT was apparent in the latter part of the war from samples of captured German uniforms that extremely interesting developments were occurring in the German Textile Finishing Industry, particularly as a result of requirements of the German military for camouflage coloration on German uniforms and equipment and the increasing stringency in supply of German textile auxiliaries. In addition it was known that prior to the war German developments in textile finishing had made definite progress along a number of lines, and it was to be expected that firms engaged in supplying the Quartermaster Corps with textiles would find information of value in what the Germans had learned in this field during the war.

For the initial textile team sent to Germany by the Research and Development Branch of the Office of the Quartermaster General it was planned that a preliminary investigation would be made and that based upon the situation as found to exist, additional investigators would be sent at a later date to cover the field as thoroughly as seemed to be warranted. In addition, specialists in chemicals were sent to Germany to investigate the developments in water repellent treatments of textiles and in the field of synthetic detergents and washing agents.

The first textile team to arrive in Germany consisted of the following men: Joseph Meierhans, J. P. Stevens Co.; John F. Hagen, Callaway Mills; M. Earl Heard, West Point Mfg. Co.; Francis S. Richardson, Waldrich Co.; Werner Von Bergen, Forstmann Co. These man arrived in Germany in the spring of 1945 and returned in the late summer and reported at a special meeting in New York on Oct. 2, 1945 at the Engineering Societies Bldg., 29 West 39th Street, New York.

Also during the summer of 1945 Dr. Miles A. Dahlen, duPont Co. and Dr. M. L. Crossley, American Cyanamid Co., made a thorough investigation of the German Chemical Industry from the standpoint of dyestuffs, intermediates, textile auxiliaries, polymers and pharmaceuticals. Col. Stephen J. Kennedy of the Research & Development Branch, Office of the Quartermaster General, Washington, D. C., had charge of sending investigators over and Capt. James L. Truslow, U. S. Navy, was in charge in the European Theater of Operations. Capt. Truslow was succeeded the latter part of 1945 by Col. Frank M. Steadman, who is still in Germany. In the fall of 1945 the team known as the Textile Finishing Team was organized to explore German developments in this field more thoroughly than had been possible by the first investigators. This team consisted of: E. C. Geier, Duplan Corp.; Elliot Broadbent, Glenlyon Print Works; C. Norris Rabold, Union Bleachery; Glenn Jackson, Jr., U. S. Finishing Co.; Henry D. Grimes, American Woolen Co. and Thomas R. Smith, Wiscassett Mills Co.

In all more than fifty men were sent to Germany to investigate various aspects of the textile and allied industries. The reports, shown in Table I and known as the Textile Series Reports, have been released for public information by the Office of Technical Services, U. S. Department of Commerce, Washington, D. C.

Also in the series are reports of investigations made in this country under the direction of the Office of Quartermaster General of manufacturing methods used in the production of textiles for the Quartermaster Corp. It will be impossible because of the lack of time to review each of the above reports individually. Therefore, I shall take a few which I think are of major importance and review these. The main object of this review is to publicize all the reports so the textile industry at large will know where to obtain the information that has been compiled.

Shortly after the arrival in Germany of the first group of textile investigators of the Office of the Quartermaster General, a report was received of a highly significant research organization which the Germans had established in 1938 in the little town of Denkendorf about 15 miles south of Stuttgart in south Germany. From the report it was evident that the German staple fiber industry and the Germen Government had brought into existence the kind of research organization which has long been talked about in this country; here was a completely equipped mill of about 7,000 spindles wholly devoted to research on the spinning of a single type of textile fiber. Regardless of the fact that the lack of raw materials had forced the Germans into use of rayon staple for many products where it would not normally have been used, here was a research organization in its conception, approach, methods and equipment which could well serve as a basis of comparison for any research organization which might in the future be set up in this country. Their objective was research and they obtained this objective by concentrating on specific research.

This research organization is fully described in Report No. 12, "The Zellwolle Lehrspinnerei" and the results of the research carried out at Denkendorf are contained in Report No. 14, "Research Reports of the Zellwolle Lehrspinnerei."

Another very comprehensive report is No. 3, "German Technical Developments in Textile Finishing Processes" compiled by Francis S. Richardson. Report No. 18, "Supplementary Report on German Dyes" prepared by Dr. M. L. Crossley and Dr. Miles A. Dahlen, followed by report No. 19, "Dyestuffs, Intermediates, Textile Auxiliaries Polymers and Pharmaceuticals" which was translated by Dr. Joseph H. Trepagnier and Dr. Frederic T. Weishut from the original I. G. Manufacturing Processes obtained in Germany by Dr. M. A. Dahlen and Dr. M. L. Crossley, is a most comprehensive report of 231 pages. The Printing, Dyeing and Finishing Industries in Germany are fully covered in reports Nos. 20, 21 and 22 by Messrs. Elliot Broadbent, Glenn D. Jackson, Jr. and C. Norris Rabold respectively. "Package Dyeing" by T. R. Smith is report No. 23. Also included in report No. 23 is a translation by Dr. J. H. Trepagnier of an original article, "Synthetic Fibers and Their Dyeing" by Dr. E. Koester of the I. G. Farbenindustrie, Leverkusen. "Rayon Weaving and Throwing in Germany", report No. 42 by Mr. E. C. Geier has only recently been released and reveals some

* Presented at meeting, Southeastern Section, December 6, 1947.

TABLE I

Textile Series Reports

Report No.	Title	Date	No. of Pages
1	"Quartermaster Purchases of Wool Cloths and Blankets For World War II"—By Glen F. Brown	Feb. 1946	12
2	"German Developments in Warp Sizing"—By Joseph P. Meierhane, Brackett Parsons	Mar. 1946	28
3	"German Technical Developments in Textile Finishing Processes"—By Francis S. Richardson	Mar. 1946	219
4	"The Protection of Textiles and Related Products From Damage by Molds, Fungi, Insects and Flame"—By M. L. Crossley	Mar. 1946	21
5	"Screen Printing"—By M. L. Crossley, Francis S. Richardson		
6	"The Microbiological Degradation of Cotton Fabrics"—By Ralph G. H. Siu, W. Lawrence White	Dec. 1946	66
7	"The Effect of Ultraviolet Light on Cotton Cellulose and Its Influence on Subsequent Degradation by Micro-Organism"—By R. P. Wagner, Harold H. Webber, Ralph G. H. Siu	Mar. 1946	66
8	"The German Army Standard Uniform Cloth"—By Werner Van Bergen	Mar. 1946	29
9	"German Use of Paper Yarns and Fabrics"—By John F. Hagen, Ellis Brewster, Frank M. Steadman	May 1946	23
10	"Ropes Obtained from Captured Japanese Equipment"—By Textile Section, National Bureau of Standards	Mar. 1946	30
11	"The German Foam-Insulating Immersion Suit"—By Joseph P. Meierhane	May 1946	27
12	"The Zellwolle Lehrspinnerei—The German Organization for Research on the Spinning of Rayon Staple—Its Objectives, Methods and Equipment"—Compiled by OQMG "Textile Team"	May 1946	95
13	"Textile Microscopy in German"—Compiled by Werner Von Bergen. Published by the Textile Research Institute, 10 East 40th St., N. Y., N. Y.		
14	"Research Reports of the Zellwolle Lehrspinneri (Berichte)"	Nov. 1946	279
15	"Tent Design and Construction"—By W. R. Barnes & Associates	May 1946	107
16	"Temperature and Humidity Conditions Encountered In Exposure of Tents—By David H. Miller	May 1946	45
17	"Solar Radiation on Exposed Army Tents and Canvas at Camp Lee, Virginia"—By L. B. Aldrich and Associates	June 1946	99
18	"Supplementary Report on German Dyes"—By M. L. Crossley	June 1946	56
19	"Dyestuffs, Intermediates, Textile Auxiliaries, Polymers and Pharmaceuticals"—By Joseph H. Trepagnier, Frederic T. Weishut	May 1946	231
20	"The Textile Printing Industry in Germany"—By Elliot Broadbent	May 1946	64
21	"German Methods for Finishing Rayon Fabrics"—By Glenn D. Jackson, Jr.	May 1946	70
22	"Observations on the Dyeing and Finishing Methods in Germany and Austria—By C. Norris Rabold	June 1946	106
23	"Package Dyeing in Germany, Dyeing of Hosiery in Germany", and other reports.—By Thomas R. Smith, Brackett Parsons	June 1946	40
24	"Field Studies of the Deterioration of Textile Under Tropical Conditions"—By Elso S. Barghoorn	June 1946	263
25	"Areas of Quartermaster Research in Textiles"—By Lt. Col. S. J. Kennedy, Capt. Richard D. Wells, Capt. Stanley Backer.		
26	"Determination of Statistical Control and Related Factors in the Performance of Breaking Strength Testing of Fabrics"—By Norman D. Edelman	Sept. 1946	10
27	"Survey of Various Manufacturing Methods in Use by Worsted Industry for Production of Cloth, Serge, O.D."—By William B. Williamson	Feb. 1947	40
28	"Control of Factors Influencing Shade in Some Mills Manufacturing 20 oz. O.D. Suiting and 32 oz. O.D. Overcoating"—By L. DaCosta Ward	Oct. 1946	23
29	"Resin Impregnation of Cotton Fabrics for Prevention of Micro-biological Decay"—By W. Lawrence White, Ralph G. H. Siu	June 1946	7
30	"The German Woolen and Worsted Industry in World War II'—By Werner Von Bergen		
*31	"Best Fibers In German Textiles"—By John F. Hagen		
32	"Investigation of Methods for Determining the Filling Power of Feathers"—By Norman B. Edelman	Dec. 1946	21
33	"Action of Alkali Upon Cellulose"—By Albert Schaeffer	Apr. 1947	94
34	"The Use of Acceptance Testing Data to Substantiate Specification Requirements" By Stanley Backer	May 1947	17
35	"Relationship between Measurements of Air Permeability By the Gurley and Frazier Machines"—By Gerald Winston, M. I. Landaberg		18
*36	"Standardization of Army Textile Shades"—By Stanley Backer.		
*37	"Laundry Variables Affecting Shrinkage of Army Fabrics"—By Stanley Backer.		
*38	"Improvement in Color Fastness of Army Woolens"—By Stanley Backer, Mario Pesce, Frank J. Rizzo.		
*39	Comparison of Thermal Conductivity Tests for Textiles"—By Stanley Backer.		
*40	"Introduction of Objective Test Procedures in Textile Specifications"—By Stanley Backer.		
*41	"Permanent Sizing of Warps"—By Joseph H. Brant	Jan. 1947	15
42	"Rayon Weaving and Throwing in Germany"—By E. C. Geier.		
43	"Summary of Reports, Winter 1946-47 on Arctic Field Trials—Quartermaster Textiles, Clothing and Footwear—Frigid, Williawaw and Frost"—By KM Observers	Apr. 1947	415
*44	"Report of the Committee for the Evaluation of German Dyestuffs".		
*45	"Report of The A.S.T.M. Task Group Studying the Wyzenbeek Precision Wear Test Meter"—By S. Tanenhaus, Gerald Winston.		
46	"The Treatment of Army Socks for Shrink Resistance"—By Quartermaster Corps.		
47	"Micro-Climate In and About Tents"—By Norman Sissenwine.		
PB	19993—Properties and Application of Indanthrene Dyes.		

Bibliography of Scientific and Industrial Reports, issued monthly at $10.00 per year. Released for Publication, The Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

* In preparation November 1947.

Write the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. for prices of the above Reports.

TABLE II

Educational Reports

PB. No.	Rib. Ref.	Authors	Title of Report
33104	2, 994	W. D. Fales, M. E. Campbell, K. R. Fox, A. W. France	Textile Education in Germany
3891	1, 387	W. D. Fales, A. W. France	Textile Education at the Staatliche, Lehr and Versuchsanstalt fur Textil-industrie Wien, Vienna, Austria
3885	1, 333	A. W. France	The Knitting Courses at the Technikum fur Textilindustrie, Reutlingen

most interesting developments in this field.

A very valuable publication of the I. G. Farben Industry entitled, "Properties and Application of Indanthrene Dyes" was obtained from the I. G. and this book is available in photostat form in the original German. This is a most complete manual of 239 pages and 40 tables and gives complete information concerning the various methods of dyeing vat colors, including the new method known as "the Kupensaure or Vat Acid Method. This is the most complete work of its kind that has ever been produced by any dyestuff manufacturer in the world. It is hoped that this work will be available at a later date in English. This report is P B 19993.

A series of reports on "Textile Education in Germany" have been released as a result of a study made by W. D. Fales of the Rhode Island School of Design; M. E. Campbell of the N. C. State College; Kenneth R. Fox of Lowell Textile Institute and A. W. France of the Philadelphia Textile Institute. The three reports of this survey which have been released are shown in Table II.

Reports by Julian F. Smith on "Textile Research and Education in Germany" which have been released are shown in Table III.

The Bibliography of Scientific and Industrial Reports is a weekly publication released by the Office of Technical Services, Department of Commerce, which lists every week an average of 800 reports and technical documents. The subscription is $10.00 per year and can be ordered from the Superintendent of Documents, Washington, D. C. Over 40,000 reports were issued during the Office of Technical Service's first year of operation. Each one is listed and abstracted in the Bibliography. Information concerning the Bibliography can be obtained by writing to the office of Technical Services, Department of Commerce, Washington 25, D. C.

Following a request last spring from the Dow Chemical Company, an investigation of German dry cleaning machines and processes was made by W. D. Appel of the National Bureau of Standards. His report entitled "Dry Cleaning in Germany" has been released as PB44956,4,196.

An investigation on the use of cotton in Germany as reported in PB4495, "Factors Relating to Prospects for Exporting U. S. Cotton to Germany", by R. C. Jackson, was a determining factor in the decision specifying the amount of cotton which should be exported to Germany this year. The investigation now in progress by Reed P. Dunn is being carried out to determine which of the lower grades of U. S. cotton can be handled to best advantage by German machinery and also the general utility value of products made

TABLE III
Research and Educational Reports

PB. No.	Bib Ref.	Authors	Title of Report
3893	1, 965	J. F. Smith	Wartime Textile Research and Education in Germany, a Survey of Documents
22436	2, 151	J. F. Smith	Textile Research—Textile Education Spinnstof Fabrik Zehlendorf Wupperstr (on Teltow Kanal)
22431	2, 151	J. F. Smith	Textile Research and Education Hohere Facshchule Fur Textil-industrie at Aachen

by German methods of blending cotton with artificial fibers.

The double warp (Simplex) knitting machine, made by both Ernst Saupe and by Schneider and Reuthner, has proven to be of great interest to the American knitting industry. A set of drawings for the Saupe machine has been released as PB15567. One American manufacturer was building a similar machine and was anxious to obtain a copy of this set for comparison. Two other sets of drawings of knitting machines, namely a new high sped Tricot warp knitting machine and a warp knit stocking fabric machine with novel features were obtained and released.

Interesting German modifications of the Maratti circular warp knitting machine were described with photographs in PB 20135. A report which has stimulated a great deal of interest is PB502 by a British CIOS team. Evacuation to England of certain German Knitting machinery is indicated, and the British have agreed to arrange for American TIID investigators to carry out inspections where some of the machinery is located. A set of machines for the automatic manufacture of knitting machine needles will probably be studied in England by American representatives in the near future.

Twenty-one recent German patents on knitting machines have been obtained from Germany and released as PB19455-19461, inclusive; PB19463-19472, inclusive; PB32513-32515, inclusive.

A report by Henry D. Grimes, "Dyeing and Finishing of Woolens and Worsteds in Germany" has been released as PB 16098.

Three recent British reports, BIOS Final Report Nos. 421, 1088, and 1120 entitled "Textile Auxiliary Products", "Textile Printing in Germany", and "German Synthetic Fibres-Wet Processing", will be abstracted in the Bibliograpthy soon, these reports will be available at a later date from the Office of Technical Services. The British investigations were carried on simultaneously with the American in the various zones of occupation.

I am indebted to Dr. Walter J. Wyatt, Textile Section, National Bureau of Standards and to Dr. Stephen J. Kennedy of the Research and Development Branch, Military Planning Division, Office of the Quartermaster General, for information contained in this review.

Membership Applications

JUNIOR

John A. Darsey—Textile Colorist, E. I. du Pont de Nemours & Co., Atlanta, Ga. Sponsors: W. F. Crayton, S. J. Davis.

Marguerite P. Kearns—Textile Chemist, United Piece Dye Works, Lodi, N. J. Sponsors: C. A. Heydon, R. Eck.

Marian K. Krape—Research Asst., The Ellen H. Richards Inst., State College, Pa. Sponsors: P. B. Mack, S. Davison.

Krishna A. Lokapur—In training, Danvers Bleachery, Peabody, Mass. Sponsors: D. V. Klein, J. Falcon.

B. James Manchester—Lab. Tech., Cranston Print Works, Cranston, R. I. Sponsors: E. W. Lawrence, H. J. Cranston.

Burton S. Manton—Textile Chemist, Plymouth Dye Works, Paterson, N. J. Sponsors: C. A. Sylvester, C. A. Seibert.

Henry J. Menger—Foreman, Holland Laundry, Inc., Philadelphia, Pa. Sponsors: P. Theel, T. H. Hart.

Richard E. Nickerson—In training, E. I. du Pont de Nemours & Co., Inc., Edgewater, R. I. Sponsors: C. A. Seibert, C. A. Sylvester.

John H. Propst, Jr.—In training, Clearwater Mfg. Co., Clearwater, S. C. Sponsors: J. L. Wyman, T. T. Wilheit.

Camillo Serano—Lab. Asst., Hellwig Dyeing Co., Philadelphia, Pa. Sponsors: S. Aumuller, A. W. Etchells.

Fred B. Shippee—Asst. Chemist, United States Finishing Co., Sterling, Conn. Sponsors: F. Stubbings, M. F. Davis.

Helen C. Simonson—Chemist, Joseph Bancroft & Sons Co., Wilmington, Del. Sponsors: A. L. Lippert, W. P. Hall.

Kenneth G. W. Smith—In training, Canadian Industries Ltd., Montreal, P. Q., Canada. Sponsors: J. W. Killheffer, C. A. Sylvester.

Alexander C. Sutherland—Chemist, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Sponsors: C. A. Sylvester, C. A. Seibert.

Sanford P. Young—Tech. Repres., Textile Resin Dept., American Cyanamid Co., Charlotte, N. C. Sponsors: J. N. Grant, R. W. Angstadt.

ASSOCIATE

Raymond B. Anthony—Salesman, Solvay Sales Div., A. C. & D. Corp., Boston, Mass.

Peter M. Benjamin—Buyer, United Merchants & Manufacturers, Inc., New York, N. Y.

Bernard Blickman—Asst. Secretary, S. Blickman, Inc., Weehawken, N. J.

Christoph A. Burkhardt—Chemist, Hickory, N. C.

Raymond L. Burnett—Dyestuffs, E. I. du Pont de Nemour & Co., Inc., New York, N. Y.

Frank J. Chadwick—Sales Repres., Nopco Chemical Company, Harrison, N. J.

John B. Duckett—In chg. of Dyestuff Lab., Calco Chemical Div., St. Lambert, P.Q., Canada.

Milton Frankel—Dyestuff Dept. Mgr., Allied Raw Materials Co., New York, N. Y.

Frederick E. Hilger—General Dyestuff Corp., New York, N. Y.

William E. Howell—Tech. Service, Hercules Powder Co., Wilmington, Del.

Dorothy C. Legendre—Scientific Aide, South. Reg. Research Lab., New Orleans, La.

John K. McClellan—Eng. Sales Div., Esso Standard Oil Co., New York, N. Y.

Carnot P. McDonald—Sales Technologist, E. I. du Pont de Nemours & Co., Inc., Atlanta, Ga.

Vimal S. Mehta—Vimals', Bombay, India.

Arthur E. Mitchell—Salesman, Sandoz Chemical Works, Inc., Chicago, Ill. Sponsors: A. A. Barker, H. L. Schwarz.

John W. Romine—Lab. Asst., Pepperell Finishing Div., Pepperell, Ala. Sponsors: C. B. Ray, R. W. Price.

William H. Schreiber—Mgr., Chem. & Dye Depts., M. Paquet & Co., Inc., New York, N. Y.

Allan M. Siegel—Director, Industrial Research & Testing Labs., St. Louis, Mo.

Frieda A. Sloop—Instructor, Syracuse University, Syracuse, N. Y.

Richard H. Tuttle—Director of Research and Quality Control, Fieldcrest Mills, Div. of Marshall Field & Co., Inc., Spray, N. C.

Technical Program Augusta Convention October 21-23

Persons desiring to contribute papers for the Technical Program or who have suggestions for desirable topics and authors should advise Dr. Miles A. Dahlen, Room 8518, Nemours Building, Wilmington, Delaware, as soon as possible.

See page P183, March 22nd issue, for details of the technical program.

Electrolyte Builders for Surface Active Agents*

J. C. HARRIS

Central Research Department, Monsanto Chemical Company, Dayton 7, Ohio

THE addition of one material to another to produce an unexpected or unpredictable improvement in some quality may be said to have a synergistic effect. When such mutual effect is recognized as a possibility or probability a more definite term may be applied. The worker in the practical field of surface active agents has borrowed the term "builder" from the soap industry, where soap building has been practiced for many years.

The "building" of detergents by the addition of materials which increase surface activity is an intriguing problem. It is of paramount importance to the consumer because it provides improved results for his detergent dollar. To the manufacturer, builders oftentimes determine whether or not a potentially high priced (hence probably non-competitive) product can be introduced to the market. Since builders so intimately affect both consumer and manufacturer, they warrant more study than they have received even though this study has been decidedly more than cursory.

The presence of sodium sulfate or sodium chloride in synthetic detergents has in many cases incorrectly been interpreted as diluent or make-weight addition. While such materials may be concomitant to the manufacture of these products, one of the purposes of this paper is to show that, when used in proper amounts, these are not diluents but function as "builders".

The building of soap for textile or laundry purposes has been customary for so long that it almost seems a historical matter. However, the real mechanism behind soap building is really not too well understood, though numerous theories have been developed and discarded. No attempt will be made to investigate this particular field except as it impinges upon the general subject. In view of the fact that soap has been "built" for so many years, it is not unusual that the same materials, generally alkaline salts, should be used to improve the newer synthetic materials. In general, the same mechanism (or mechanisms) should perhaps explain the improvements observed through builder addition to soap and synthetic products.

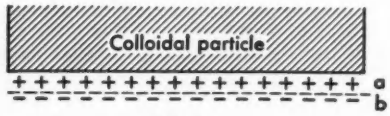


Figure 1.—Diagrammatic Conception of the Helmholtz Double Layer (1).

General Principles

Surface active agents are materials which exhibit colloidal phenomena, i.e., solutions show particle sizes between 1 and 100 mμ, and lie somewhere between coarse suspensions and ionic solutions. They fail to penetrate a permeable membrane, exhibit Brownian movement, but in particular, they can vary in size with the conditions existing in their solutions. That is, their size can change with temperature, concentration and electrolyte addition. With such change in state the specific surface changes greatly, and it is this phenomenon which has been the subject of intensive research for years.

Surface and interfacial tension minima mark the point of critical association of colloidal solutions, while this same phenomenon can be ascertained by measurement of conductivity, depression of freezing points, measurement of light scattering and refractive index. X-ray diffraction methods however, have given greater meaning to the colloid system by elucidating the size of colloidal particles, and the size of aggregations of these particles into micelles, or regularly oriented association of colloidal molecules.

Micelles are considered to consist of charged particles dispersed in a continuous medium, the charge of the particle being attributed to a layer of surface ions adsorbed onto or composed of the material of the particle, and surrounded by an outer layer or envelope of compensating ions. This layer is not rigid, but decreases in density with distance from the interface. Figure 1 shows the diagrammatic conception of the Helmholtz double layer, but the present conception differs from the rigid structure shown.

X-ray diffraction data have assisted in more clearly defining the possible structure of micelles. A typical example is that of Harkins and his co-workers (2) shown in Figure 2. This example is that of a cross section of soap micelles in 15% potassium laurate solution. Other systems have been explored and likewise show a specific structure.

That there are various types of micelles is indicated by Figure 3. The literature is not as yet regulated with respect to nomenclature and no attempt will be made to classify the potential types of micelles, except to point out that the field is still under investigation. It should be noted in Ackley's illustration that the surface active ion is cationic, but the illustration is valid nevertheless, with signs changed for anionic agents.

Figure 2—Cross Section of Soap Micelles in 15% Potassium Laurate (2).

* Presented at meeting, Northern New England Section, Nov. 21, 1947.

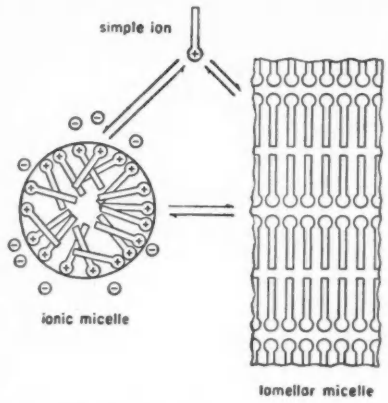


Figure 3.—States of Surface Active Cations in Solution (3).

Surface active agents tend to orient themselves at interfaces as diagrammatically shown in Figure 4, and the speed and quantitativity with which this takes place depends upon the inherent activity of the agent, markedly influenced by the presence of ionic electrolytes. That such ionic electrolytes or "builders" have a profound effect upon surface activity as exhibited by improvement in detergency, wetting and surface and interfacial tension characteristics, has long been recognized, but the practical application of the theoretical data has not been generally practiced.

TYPES OF SURFACE ACTIVE AGENTS.—There are three generally recognized types of surface active agents, e.g. anionic (soaps, fatty alcohol sulfates, alkyl benzene sulfonates), cationic (quaternary ammonium or pyridinium halides) and nonionic (polyglycol or polyalkylene oxide derivatives), as exemplified by Figure 5.

Dependent then upon the ionic charge of the agent, certain general reactions may be predicted to occur. Examples of the effects produced by anionic type materials upon cationic surface active agents is shown in Fig. 6. Hence it may be expected that if the materials are oppositely charged and neutralize one another in some instances there may be actual formation of a precipitate, and the combination will lose all efficiency potentially available from either constituent. Ionic electrolytes of predominantly negative charge will not act as a builder for cationic surface active agents. For anionic agents, the reverse situation might be expected to be true, but dependent upon the specific shielding of the carboxy group, or its entire absence, only di- or trivalent cationic builders will result in inactivation of anionic surface active substances.

The case of nonionics has not been investigated, but since they do form micelles,

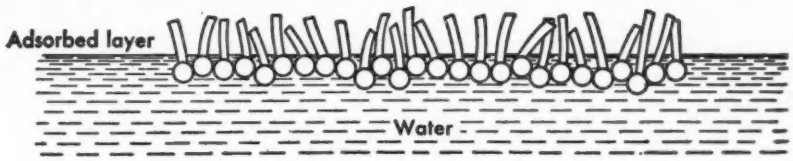


Figure 4.—Monomolecular Film of Oriented Polar Molecules on Water (1).

presumably with a much weakened electrical charge, both anionic and cationic electrolyte builders should produce some effect, but to a much lessened extent than with the definitely charged active agents.

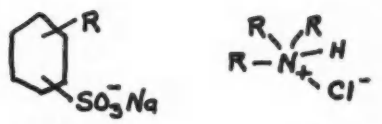
Experimental Evidence

The ionic electrolytes most generally encountered may arbitrarily be subdivided as were surface active agents, according to their charges:

Cationic	*Anionic*
$Ca++Cl_2$	$NaCl^-$
$Al+++Cl_3$	$Na_2CO_3^{--}$
	$NaPO_4^{---}$
	$Na_4P_2O_7^{----}$

Other cations and anions obviously can, and have been used, but these illustrations suggest the possibilities.

SURFACE AND INTERFACIAL TENSION.—Tables I and II show the effect of added electrolyte upon the amount of surface active agent required to produce critical changes in surface and interfacial tension. It is at once evident that by the addition of electrolytes the concentration of both anionic and cationic agents may be reduced from 1/10 to ½ the amount of



Anionic *Cationic*

$R\text{-}O\text{-}C_2H_4O\text{-}\text{-}\text{-}C_2H_4OH$

Nonionic

Figure 5—Types of Surface Active Agents.

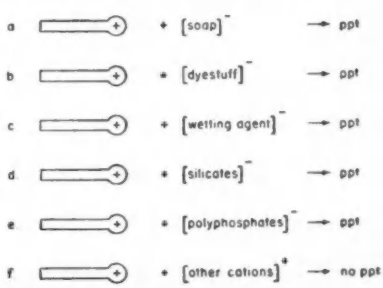


Figure 6—Reactivity of Surface Active Agents (3).

pure agent originally required, and that the mechanism is true for both types of surface active agent. However, essentially

TABLE I

Surface Active Agents—Electrolyte Compositions

ANIONIC

Surface and Interfacial Tension

	Agent and Electrolyte	*Concentration*	*Effect of Added Electrolyte*	*Author Reference*
(1)	Sodium cetyl sulfate	0.0001M	ST reduced by	
	NaCl	0.02M	24.6 dynes/cm	
	HCl	0.02M	25.2 dynes/cm	
	NaOH	0.02M	23.4 dynes/cm	4
(2)	Sodium dodecyl sulfate	0.0008M		
	NaCl	1%	1/9 active to produce same IFT	5
(3)	Sodium dodecyl sulfate	0.0025M		
	NaCl	0.2%	½ active to produce same ST	5
(4)	Sodium dodecyl sulfate	0.004M		
	$CaCl_2$	0.00045%	½ active to produce same IFT	5
(5)	Sodium dodecyl sulfate	0.0037M		
	$CaCl_2$	0.0006%	½ active to produce same ST	5
(6)	Igepon T ($C_{17}H_{33}CON(CH_3)C_2H_4SO_3Na$)	0.005%	IFT reduced from 6.25 to 1 dyne/cm	6
	NaCl	0.32N		
	$CaCl_2$	0.003N		
	$LaCl_3$	0.00005N		
(7)	Sodium oleate			
	NaCl	0.15N	IFT reduced 7.2 dynes/cm	
	$CaCl_2$	0.0015N	IFT increased 2.45 dynes/cm	7
(8)	Sodium tridecane-7-sulfonate	0.00227M (0.0687%)	1/6 active to produce same ST	8
	NaCl	0.13N		
	KCl	0.1N		
	$MgCl_2$	0.01N		
	$CaCl_2$	0.01N		
(9)	Diamyl sodium sulfo-succinate (Aerosol AY)	0.1-1%	ST or IFT reduced to that of pure material	9
	NaCl	0.08-0.8%		
	$MgCl_2$	0.033-0.33		
	$CaCl_2$	0.033-0.33		

TABLE II
Surface Active Agents—Electrolyte Compositions

CATIONIC

Surface and Interfacial Tension

Agent and Electrolyte	*Concentration*	*Effect of Added Electrolyte*	*Author Reference*
Cetyl trimethyl ammonium bromide	0.0025%	1/6 the active to produce same	
Na_2SO_4	0.01N	lowering of ST	10
Cetyl pyridinium bromide	0.01%	1/10 the active to produce same	
NaBr	0.002N	lowering of ST	11

TABLE III
Effect of Cation Upon Surface and Interfacial Tension of Dodecyl Benzene Sodium Sulfonate (12)

Surface and Interfacial Tension Measurements
(By duNouy Tensiometer)

Builder	*Surface tension (Corrected according to Harkins and Jordan) % concentration*			*Interfacial tension (Nujol) % concentration*		
	1.0	0.25	0.0625	1.0	0.25	0.0625
*None	32.0	31.2	30.3	5.2	3.5	3.1
NaCl	28.4	29.7	31.6	2.5	2.5	3.5
Na_2SO_4	29.2	30.2	30.4	2.9	2.8	3.3
Na_2CO_3	28.5	30.3	30.9	2.7	3.6	5.1
$Na_4P_2O_7$	29.4	30.6	34.8	2.7	4.3	8.4

* Active ingredient concentration throughout is 0.4 at 1.0%, 0.1 at 0.25% and 0.025 at 0.0625%

neutral electrolytes must be used with cationic agents. Similar data is not presently available for nonionic agents.

The fact that the amount of surface active agent can be reduced by from ½ to 1/10 is certainly significant from a practical viewpoint, since this potentially represents a marked economy in operation.

Table III shows the effect of polyvalent cations upon both surface and interfacial tension of the anionic dodecyl benzene sodium sulfonate. In each concentration, 60% of the total represents the indicated builder and the balance is the active agent. The addition of electrolyte results in a decrease in both surface and interfacial tension with certain important exceptions. These exceptions occur at the lowest concentration, in which the values are at best only equal to the active agent alone, and exceed those values in two cases. Both these cases represent alkaline salts, and both are polyvalent in character, the tetravalent tetrasodium pyrophosphate earlier and more quantitatively showing that the critical concentration for the anion has been exceeded.

It should therefore be noted in connection with the anionic surface active agents that the valence of the cation has a marked influence upon reduction in surface and interfacial tension. Further, that increase in valence radically decreases the amount of electrolyte necessary for the critical change in values.

WETTING.—Most of the data concerned with the effect of electrolytes upon surface active agents appears to have been accomplished by measurement of surface and interfacial tensions. Two references however, are concerned with evaluation using a practical wetting test. Dreger, et al., *(8)* demonstrated the effect of NaCl, HCl, $MgCl_2$ and $AlCl_3$ upon the wetting times of aqueous 2.27 x 10^{-3} molal sodium tridecane-7-sulfate. For purposes of comparison an arbitrary wetting time of 10 seconds was chosen, and a comparison made of the normality of electrolyte required to attain this wetting speed, (canvas disk test), as shown in Table IV. This data demonstrates (1) that monovalent cations are essentially equivalent in their effect, (2) that the divalent cations are in the same general range, but that solubility effects may influence results, and (3) that a trivalent cation requires comparatively extremely small amounts to attain the same results. A 0.00227N solution of sodium tridecane-7-sulfate without added electrolyte would not wet in 10 minutes, so the effect of electrolyte in this case is even greater than in others.

TABLE IV
Canvas Disk Data for 10 Seconds Wetting Time Sodium Tridecane-7-Sulfate (8)

	Normality
NaCl	0.38
HCl	0.34
$MgCl_2$	0.14
$CaCl_2$	
$AlCl_3$	0.001 (approx.)

Harris *(12)* using the canvas disk method in evaluating dodecyl benzene sodium sulfonate showed in Figure 7 that substantial reduction in the amount of active agent could be made, by adding sodium sulfate as a builder. In this case 40% active agent was built with 60% sodium sulfate to actually yield improved wetting time over the pure product. Consequently greater than a 60% saving of active agent may be realized by proper building.

Attempts were made to supplement this data by demonstrating the effect of ionic

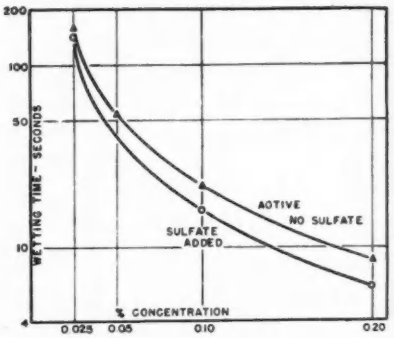


Figure 7—Canvas Disk Wetting Times with Dodecyl Benzene Sodium Sulfonate (12).
Active—No Sulfate—100% DDBSS.
Sulfate Added—60% DDBSS, 40% Na_2So_4.

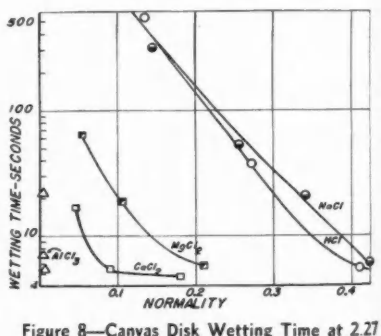


Figure 8—Canvas Disk Wetting Time at 2.27 x 10^{-3} Molal Sodium Tridecane-7-Sulfate (13-7) vs. Concentration of Salt or Acid Added, at 43.1-46.17° C. (7).

TABLE V
Draves Wetting Tests

Addition of Electrolyte to Dodecyl Benzene Sodium Sulfonate

Electrolyte	*Actual Molar Quantity Used* DDBSS	Elec.	*Wetting Time in Seconds—Draves Molarity of DDBSS Used* 0.01	0.005	0.0025	0.00125
None	0.01	....	8.5	17.0	74.3	+180
NaCl	0.01	0.1	8.2	17.7	63.0	+180
NaCl	0.01	0.01	9.6	17.6	61.3	+180
NaCl	0.01	0.001	9.7	19.6	69.3	+180
Na_2SO_4	0.01	0.1	8.1	19.2	46.6	+180
Na_3PO_4	0.01	0.1	15.9	31.2	95.2	+180
$Na_4P_2O_7$	0.01	0.1	16.6	37.0	85.5	+180
LiCl	0.01	0.1	7.8	18.9	57.4	+180
$MgCl_2$	0.01	0.1	13.2	36.6	+180	
$MgCl_2$	0.01	0.01	8.1	25.6	67.6	+180
$MgCl_2$	0.01	0.001	7.5	22.8	67.1	+180
$AlCl_3$	0.01	0.001	10.3	24.9	119.5	+180
$AlCl_3$	0.01	0.1	+180			

TABLE VI
Draves Wetting Tests

Addition of Electrolyte to Nonionic Surface Agent

Electrolyte	Actual Molar Quantities Used: Nonionic	Elec.	Wetting Time in Seconds—Draves: Molarity of Nonionic Used 0.01	0.005	0.0025	0.00125	0.000625
None	0.01	....	3.0	6.5	16.0	56.7	+180
NaCl	0.01	0.1	2.5	4.9	14.7	70.2	+180
NaCl	0.01	0.01	2.8	5.5	16.6	57.3	+180
NaCl	0.01	0.001	2.9	6.3	15.3	77.1	+180
Na_2SO_4	0.01	0.1	3.2	6.0	19.5	68.5	+180
Na_3PO_4	0.01	0.1	4.0	7.9	21.3	50.6	+180
$Na_4P_2O_7$	0.01	0.1	4.9	9.3	20.4	85.7	+180
LiCl	0.01	0.1	3.1	7.1	17.3	60.6	+180
$MgCl_2$	0.01	0.1	2.7	6.0	13.5	44.4	+180
$MgCl_2$	0.01	0.01	2.9	5.8	14.9	90.2	+180
$MgCl_2$	0.01	0.001	2.9	6.3	14.6	47.5	+180
$AlCl_3$	0.01	0.1	2.6	5.3	12.8	81.9	+180

TABLE VII
Electrolyte Effect Upon Detergency

Sodium Tridecane-2-sulfate Concentration — 0.0035 Normal (8)

Electrolyte	Molality	Units Soil Removed
NaCl	0.171	11
	0.08	12
	0.0316	12
	0.0159	10
$CaCl_2$	0.006	9
	0.003	11
	0.0015	10
$AlCl_3$	0.003	7
	0.0015	11
None	0.00908	9

electrolytes upon commercial dodecyl benzene sodium sulfonate and a commercial nonionic surface active agent, utilizing the Draves wetting test. The mechanism of the demonstration involved the addition of certain molar quantities of electrolyte to a constant molar concentration of surface active agent. A more complete investigation should involve the reverse process, varying the surface active content with constant electrolyte concentration.

Table V shows the wetting results obtained with dodecyl benzene sodium sulfonate (DDBSS). It is apparent that valency of anion exerts relatively slight effect until the valency reaches three or four, and that rather than improving the wetting characteristics, it is indicated that the molar ratio for critical effect of electrolyte was exceeded using the polyvalent salts.

The results obtained with dodecyl benzene sodium sulfonate and cationic electrolytes is considerably more pertinent. A monovalent cation produced little effect in the concentration ratio tested. The divalent cation shows definitely that a ratio of surface active agent to electrolyte can be reached which actually will reduce surface activity. Obviously a ratio of optimum range could be determined here, but from the data shown a very pertinent fact is illustrated. This is, that excessive amounts of ion opposite in charge to that of the surface active agent can cause reduction in surface activity. This is illustrated both in this case, and that of conversion of dodecyl benzene sodium sulfate to the magnesium salt in detergency tests. Trivalent cations demonstrate this effect in a more pronounced manner.

The same test mechanism was applied to a commercial nonionic surface active agent (shown in Table VI) and with but two minor exceptions, the nonionic agent shows no criticality toward the addition of electrolytes, regardless of ion charge. This follows theory rather well since in general it might be expected that ionic charge would have at best only slight effect upon such agents. There is evidence however, that nonionics do form micelles, and if this is so, then there will probably exist ranges of builder concentrations which will reduce the critical concentration for optimum surface activity.

DETERGENCY.—There is comparatively little specific data available from the literature, to show the effectiveness on a comparable basis of electrolyte addition upon detergency, in spite of the wide acceptance of builders. Dreger, et al., *(8)* show the effect of electrolytes upon three different secondary alcohol sulfates, indicating that the length of alkyl chain and placement of sulfate group affect the detergency of the agent plus electrolyte. Table VII shows data for sodium tridecane-2-sulfate.

It is apparent therefore that the addition of electrolyte can reduce the amount of active agent to less than 1/3 that required in their absence.

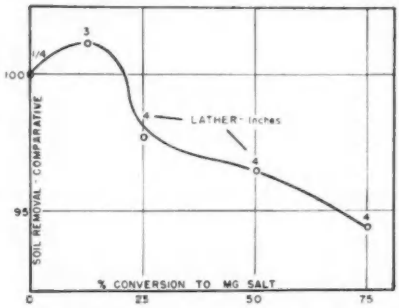


Figure 9—Effect of Magnesium Sulfate Upon Detergency and Lather of Dodecyl Benzene Sodium Sulfate (12).

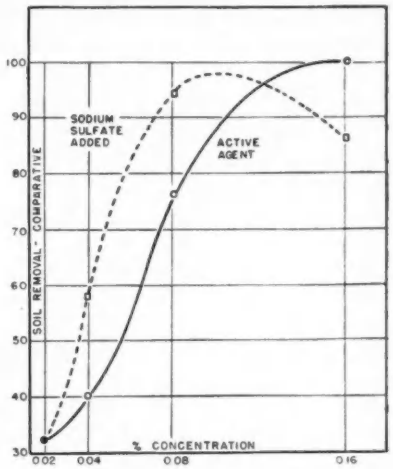


Figure 10—Effect of Sodium Sulfate Upon Detergency of Dodecyl Benzene Sodium Sulfonate (12).
Active Agent —100% DDBSS.
Sodium Sulfate Added—Same concentration of 100% DDBSS plus 40% Sodium Sulfate.

The effect of partial conversion of the sodium salt of dodecyl benzene sulfonate to the magnesium salt is shown in Figure 9. From this it is apparent that optimum results are obtained at not greater than 1/8 conversion to the magnesium salt, and that in excess of this conversion actually results in impaired detergency.

Sodium sulfate is shown as a builder for dodecyl benzene sodium sulfonate in Figure 10. In this case, as in Figure 7, active dodecyl benzene sodium sulfonate was built with 60% sodium sulfate. It is apparent that equivalent detergency results can be obtained with the diluted product, but that beyond a certain maximum active content detergency actually decreases with increase in both active agent and electrolyte.

LATHER.—The effect of added electrolyte upon the volume of lather produced is likewise affected. Dreger *(8)* shows that foam of secondary alcohol sulfates can be increased from 5-12 fold by such addition. In this case maximum foam improvement resulted from monovalent cations, being reduced in volume by the divalent and trivalent cations. In other words, in order of decreasing effctiveness the salts are

NaCl
$MgCl_2(CaCl_2)$
$AlCl_3$

The effect of the polyvalent cation in this case is one of insoluble salt formation resulting in lowered lathering efficiency. Used in less than the amounts noted it is theoretically possible for them to improve lather, but the amounts used were evidently excessive.

TABLE VIII

Effect of Sodium Sulfate Upon Dodecyl Benzene Sodium Sulfonates

Santomerse No. 3.....100% DDBSS.
Santomerse No. 1..... 60% DDBSS.
40% Sodium Sulfate

Lather Values

25 ± 0.2° C.
Concentration 0.05%
(Lather Height in Cms.)

	50 p.p.m. water		*300 p.p.m. water*	
	At once	*After 5 min.*	*At once*	*After 5 mins.*
Santomerse No. 3.....	13.2	12.8	13.5	12.8
Santomerse No. 1.....	15.7	15.1	9.8	9.4

Another indication of the effect of electrolyte upon lather is shown in Table VIII. The effect produced upon dodecyl benzene sodium sulfonate by sodium sulfate is quite apparent, as an actual improvement in lather results, even though the active content is reduced to 40% in this case. The reduction of lather for the "built" product in hard water is attributable to the fact that the allowable minimum of Ca and Mg ions has been exceeded. It will be recalled that Dreger showed decreasing requirements of bivalent over monovalent cation, and also exceeded the optimum requirements.

Theoretical Considerations

The Schulze-Hardy rule for the coagulation of colloids by oppositely charged ions appears to apply to builder addition. The order of ion effectiveness is: Trivalent>Divalent>Monovalent. Bancroft *(13)* indicates that there are many exceptions to this rule and factors affecting it are the specific character of the anion, cation, suspension, and the hydrogen ion concentration. The effect of electrolytes upon micelle formation has already been stressed, particularly in their effect in lowering the critical concentrations of surface active agent. Consequently, even though there are many exceptions to the Schulze-Hardy rule, it applies rather generally to surface-active agents and electrolyte systems.

Cassie and Palmer *(14)* derived a mathematical treatment to explain the effect of electrolytes upon surface active materials. Ionic electrolytes increase surface activity at the surface by resulting in a lowering in potential energy of the dissolved surface active ions at the surface, which in turn results in displacement of equilibrium in favor of the surface to give greater surface pressures, thus increasing activity. They specifically note that the effect upon surface tension is entirely dependent upon ions of sign opposite to that of the surface active species.

Also applicable to the use of builders is the Hofmeister Series *(15)*. The anions, in decreasing order of coagulative effect upon colloidal solutions are:

Citrate>tartrate>sulfate>acetate>chloride;

SO_4>Cl>NO_3

The cations in order of increasing effectiveness are:

K<Mg<Ca<Sr<Ba<Al<H

Here also the reservations of Bancroft are applicable.

The fact that electrolytes have specific effect upon emulsion stability is reviewed at length by Clayton *(16)*, but many emulsions certainly are colloidal systems or utilize surface active colloidal substances in their preparation, so that the specific effect of electrolytes is not unsuspected.

Summary of Facts Concerning Builders

(1) Addition of ionic electrolytes to *anionic* surface active agents can effect the following changes:

(a) Reduce surface and interfacial tension.

(b) Reduce critical conductivity.

(c) Improve wetting speed.

(d) Increase lather.

e) Increase detergency.

(2) Addition of *anionic* electrolytes(e. g., silicates, phosphates, etc. to *cationic* surface active agents in general result in inactivation of the agent. Addition of cationic electrolytes (calcium chloride), aluminum chloride) in general exhibit only slight effect.

(3) Addition of ionic electrolytes to a nonionic surface active agent results in essentially no effect upon wetting.

(4) The valence of the added anionic or cationic builder has marked effect upon the physico-chemical properties of anionic surface active agents.

(5) Markedly smaller amounts of polyvalent anionic or cationic builders are required to produce a given change in property. Excessive amounts beyond optimum generally result in significant reduction in surface activity.

(6) Builders for anionic surface active agents which hydrolyze to yield alkaline solutions are in general better builders than those which provide essentially neutral solutions. Conversely, electrolytes which hydrolyze to yield acid solutions can likewise produce greater effect upon surface activity than neutral ones.

(7) Builder addition to anionic agents to produce a given result can decrease the quantity of surface active agent from 2 to 10 fold. The economy of this procedure is obvious.

(8) The addition of builders to accomplish a given purpose can be reduced to a science.

Acknowledgment

The assistance of Laura Christman in preparing the wetting test data is gratefully acknowledged.

Bibliography

(1) Hartman, R. J., Colloid Chemistry, Houghton Mifflin Co., p. 226 (1939).
(2) Harkin, W. D., Mattoon, R. W., and Corrin, M. L., J.A.C.S., Vol. 68, pp. 220-228 (1946).
(3) Ackley, R. R., Soap, Vol. 23, No. 3, pp. 39-42, 93-94, (1947).
(4) Long, F. A., Nutting, G. C., Harkins, W. D., J.A.C.S., Vol. 59, 2197-2203 (1937).
(5) Powney, J., and Addison, C. C., Trans. Farad. Soc., Vol. 33, pp. 1253-1260 (1937).
(6) Robinson, C., Nature, Vol. 139, p. 626 (1937).
(7) Harkins, W. D., and Zollman, H., J.A.C.S., Vol. 48, pp. 69-80, (1926).
(8) Dreger, E. E., Keim, G. I., Miles, G. D., Shedlovsky, Leo, and Ross, John, I.E.C., Vol. 36, pp. 610-617 (1944).
(9) Cupples, H. L., Soap, Vol. 15, No. 9, pp. 30-31, 41, (1939).
(10) Hill, J. A., and Hunter, C.L.F., Nature, Vol. 158, p. 585 (1946).
(11) Adam, N. K., and Shute, H. L., Trans. Farad. Soc., Vol. 34, pp. 758-765 (1938).
(12) Harris, J. C., Oil & Soap, Vol. 23, pp. 101-110 (1946).
(13) Bancroft, W. D., Applied Colloid Chemistry, McGraw-Hill, p. 305 (1932).
(14) Cassie, A. B. D., and Palmer, R. C., Trans. Farad. Soc., Vol. 37, pp. 157-168 (1941).
(15) Hauser, E. A., Colloidal Phenomena, McGraw-Hill, p. 132 (1939).
(16) Clayton, W., Theory of Emulsions and Their Treatment, Blakiston, 4th Edition, (1943).

All reports and technical papers of local sections should be sent to the National Secretary

Hosiery Group Meeting—

Nylon Staple in Hosiery*

W. B. VINCENT

Sales Development, Nylon Division, E. I. du Pont de Nemours & Company

Introduction

MR. CHAIRMAN, Ladies and Gentlemen, it is a pleasure to be here this afternoon. I appreciate the opportunity to present to this group a summary of the development work which has been conducted in the hosiery field with yarns spun of nylon staple.

Nylon staple is fundamentally different from the multifil and monofil continuous filament nylon yarns, in that it is a short, crimped fiber which is spun into yarns on the conventional spinning systems. With yarns which are produced from staple, it is possible to make products of nylon with new and different properties. Men's hosiery knit of spun yarn is a splendid example.

Nylon staple is a fiber which seems likely to secure a place in hosiery because of its inherent properties. It is not a substitute or replacement for the so-called standard fibers. It is an "individual" with distinct and positive properties of its own which place it naturally and on a sound technical basis in this industry.

We are all aware of the success of continuous filament nylon yarn in ladies' full-fashioned and seamless hosiery. This situation was not a result of accident but the result of the fact that nylon had certain properties which made it immediately applicable to the ladies' full-length hosiery field. These basic properties of nylon, which include very high resistance to abrasion and dimensional stability in washing and wearing, are in part why nylon staple will be important in the spun yarn hosiery field. In addition to the purely physical characteristics of nylon, there are other properties imparted by the crimped staple to the structure of the fabric.

Discussion

NYLON STAPLE.—Nylon staple is produced with a crimp or crinkle which imparts loft to the yarns and to the fabrics knit of these yarns. Since the crimp is essentially permanent, this characteristic of loft is maintained throughout the life of the fabric. The crimped nylon fiber is an example of a fiber "engineered" for specific uses.

The deniers now being produced are 1½, 3, 6, 10, and 15, and the staple length varies from 1 to 5 inches which makes it suitable for use on all the spinning systems. These are the Bradford and French worsted, woolen, American, cotton, and silk systems.

. . . Samples of various denier staple fibers which illustrate the material as produced were shown. . .

SPINNING.—In development work of this nature, it goes without saying that it must be possible to spin a good yarn from the fiber before any knowledge of its end product applications can be accumulated. As a result of extensive work carried out by textile machine manufacturers and spinning mills, it is possible to spin nylon staple on all the spinning systems. Also, nylon can be spun very well in blends with other fibers, including wool, cotton, viscose and acetate rayon, and silk.

TYPES OF NYLON HOSE.—The various denier staples which we are now producing enable the hosiery manufacturers to knit socks of all types. This display illustrates the splendid work done by the yarn spinners and knitters in taking advantage of the versatility of nylon staple. Very heavy athletic socks and ski socks can be produced from blends of 6 and 10 denier staple. From there, knitters can go to a medium weight athletic sock in which, for the desired effect, 6 denier staple should predominate. The argyle sock is another place where some 6 denier staple is beneficial. With reference to argyles, it is possible to manufacture a product of nylon which does not shrink and which has excellent wear.

A medium weight dress sock is another type satisfactorily knit of nylon yarn. An example is a 6 x 3 rib, 132 needle Komet which is produced from 100% 3 denier staple. It has very good appearance and its wear and washability are exceptional. This is an example of the fiber performing functional duties with respect to its wear and washability and, in addition, the appearance of the socks is very desirable. Because of the strength of spun nylon yarns and their high durability in wear, a very attractive, lightweight half hose and anklet can be produced. The 6 x 3 rib, 200-needle Komet is an illustration of this point. We believe it is reasonable to assume that this is essentially a new type of sock because it is lightweight, "warm", and durable. Also, a very lightweight, soft women's and children's anklet can be made from a blend of 1½ denier and 3 denier staple, which despite its lightweight and exceptional softness, has outstanding wear. Fine yarns from 1½ denier should be very satisfactory in the feet of full-length ladies' stockings to give cushioning action. Also, full-length ladies' stockings with a spun nylon yarn body will have warmth comparable to wool.

It can be seen from the foregoing that nylon staple is an "all-around" hosiery fiber.

To illustrate the variation of deniers for different types of nylon socks, we summarize in Table I possible deniers and blends of deniers which some spinners and knitters have tried with successful results. It is realized that this will vary depending upon the particular effect which each manufacturer wants. However, the following suggestions are considered a logical starting point.

In addition to 100% nylon socks, blends with other fibers make very desirable products. Hosiery manufacturers are already making nylon-wool socks which take advantage of the properties of both fibers. Similarly, blends of nylon with cotton, with acetate and viscose rayon, and with silk present an opportunity to the knitters to produce new types of socks covering a very wide range of properties, hand, and price. In all instances, nylon will improve stability in washing, if needed, and it will, of course, improve wear. The compatibility of nylon staple with other fibers illustrates further its

* Presented at Hosiery Group Meeting, E. J. Siegrist, Presiding, National Convention, Chicago, October 24, 1947.

TABLE I

Type of Sock	*Nylon Composition*
Lightweight Men's Ribbed	100% 3 denier
Medium Weight Men's Ribbed	100% 3 denier
Argyle	50% 3 denier—50% 6 denier
Medium Weight Athletic Socks	50% 3 denier—50% 6 denier
Heavy Weight Athletic Socks	75% 6 denier—25% 10 denier
Cushion Sole—Terry Yarn	50% 6 denier—50% 10 denier
Soft, Medium Weight Men's Socks	33% 1¼ denier—67% 3 denier
42 Gauge Full-Fashioned	100% 1½ denier
	100% 3 denier
Women's Anklets	(33% 1¼ denier And (67% 3 denier

versatility, and may very well be beneficial to the hosiery manufacturer.

PROPERTIES — WEAR. — The wear tests, both actual wear and laboratory tests, on nylon socks have shown outstanding results. We believe that the time honored chore of mending socks can be greatly reduced by the use of nylon in the toe and heel. There are many housewives in the country who will welcome this contribution of nylon. Several specific cases illustrate this phenomenal wear and these are mentioned as representative results on nylon socks.

For instance, a soft, lightweight anklet from yarns spun of 1½ denier nylon staple was worn by a housewife for 118 days and was washed 118 times. No holes developed. The lady stopped wearing it because she was rather anxious to wear some other color than she had been during the test. In the men's field, a very active, heavy set man has worn and washed a pair of lightweight 6 x 3 rib socks from 100% 3 denier nylon staple 96 times which is equivalent to at least two years' normal wear. There are still no holes in these socks. Another man wore two pairs of the 200-needle, lightweight socks from 65% nylon-35% wool for 100 days each before a small hole developed in one sock. Incidentally, this hole was near the top of the shoe and not in the heel or toe.

A college basketball team last year used several pairs of 65% nylon-35% wool crew socks. They were 108 needle socks and rather lightweight for basketball but their performance was outstanding. The socks were used from December 10 until March 13 and were in good condition at the end of the season. They were laundered every third day and no significant shrinkage occurred.

The same style socks were worn by a prep school football team and they wore very well. The boys were not accustomed to getting their normal athletic socks washed because they wore out rather quickly and were discarded for new socks. Since the nylon-wool socks did not wear out, many of the boys wore them all season without laundering. Naturally, the athletic director complained.

TABLE II

Composition	*Number of Strokes to Failure*
100% Wool	2,100
35% Nylon—65% Wool	9,000
65% Nylon—35% Wool	14,400
100% Nylon	11,100

Laboratory abrasion tests were conducted by an outside laboratory on nylon, nylon-wool, and wool socks of similar construction. The results of these tests are given in Table II. It is seen from these data that nylon makes an outstanding contribution to the wear of socks. In fact, only 35% nylon increases the abrasion resistance of wool tremendously. This, we believe is a very good illustration of how a small amount of nylon can give real assistance to other fibers.

Although these examples just presented are definite proof of the durability of nylon, the hosiery companies are very interested in learning more about how nylon staple performs in socks. For this reason, several manufacturers' hosiery knit of nylon, wool, and cotton yarns are being tested now on policemen, postmen, industrial plant personnel, and office employees.

PROPERTIES — SHRINKAGE. — It is generally known today that the public is becoming more conscious of shrinkage and concerted effort is being made by hosiery producers to make socks which resist shrinkage. Nylon is definitely an answer to this problem since one of the important properties is stability in washing. Socks from 100% nylon yarn when finished properly are practically "shrinkproof". With the use of nylon, expensive, soft and heavy type socks can be washed without fear of shrinkage. After washing they can be hung up to dry without the usual tedious job of stretching on forms to insure shape and size retention.

In blends with wool, greatly increased stability in washing can be obtained over an all-wool sock. Normally about 65% nylon is required with a blend of nylon and wool to give sufficient stability in washing. It is necessary that the nylon and wool be blended very well to achieve the best results. However, if a wool shrinkage resistance treatment is given to the socks then, of course, not as much nylon needs to be added for stability. It has been our suggestion in working with hosiery manufacturers that if a shrink resistant treatment is not given, 65% nylon should be used as a minimum amount to assure stability in washing. This suggestion has been made on the basis that if nylon is being used, one might as well take advantage of this property of stability because shrink resistance is so important.

The American Institute of Laundering ran wash tests on various nylon and nylon-wool socks. Some of the samples were subjected to mild wool type washings at 100° F. and the rest to severe fast color type washings at 140° F. A total of five washings were given. The socks were not dried on forms. The results are given in Table III. These shrinkage results are based on flat measurements. Also, it is evident from this display of socks which are the ones washed at the American Institute of Laundering that nylon does contribute very significantly to shrink resistance. While 12% shrinkage for the 65% nylon sock after five washes at 140° may seem high, one can see from the display that it really is not much shrinkage from a practical standpoint.

Actually, the real criterion of shrinkage is how the socks fit and feel after continual use and washing. For illustration, the 65% nylon-35% wool socks mentioned previously which were worn and washed 100 times, fit very well at the end of this period. They were not dried on forms.

It is true, of course, that in addition to the fiber composition, there are many variables which affect shrinkage. In the case of wool, these variables include the grade of wool, the size of the yarn, the knitting operation itself, the type of socks knit and the finishing methods. Therefore,

TABLE III

Shrinkage Measurements

Composition	*Percentage Change in Foot (Flat Measurements)*	
	Five Washes at 100° F.	*Five Washes at 140° F.*
100% Wool	—15.8	—36.0
35% Nylon—65% Wool	— 7.4	—30.1
65% Nylon—35% Wool	— 1.8	—12.2
100% Nylon	+ 1.4	— 1.7

depending upon the particular type of sock made as well as the other variables involved, the amount of nylon necessary to impart adequate shrink resistance may be slightly more or less than 65%.

PROPERTIES — COMFORT. — In discussing any new hosiery fiber, the question is always raised as to its comfort. According to the tests which have been conducted to date, a properly knit sock from properly selected spun nylon yarns is comfortable. This includes not only the lightweight dress socks but also heavy athletic socks. It is well to remember in considering socks from spun nylon yarns that when you speak of a nylon sock, this term is not all inclusive. For a particular type of sock, a particular type of nylon staple must be used. In a heavy athletic sock, for instance, one cannot use 1½ or even 3 denier staple for the complete composition. It is necessary to go to a higher denier just as in the case of wool athletic socks where coarser grades of wool are used than in wool dress socks.

Spun nylon socks are satisfactory with reference to moisture pick up and evaporation, and cushioning action. Also, the nylon fiber itself is non-allergic and does not irritate wearers.

At the present time, a wear test of nylon socks is being conducted at an industrial plant. The men wearing the socks report at this time, after six weeks' wear, that the socks are comfortable.

We have now reached the point in this paper where it is in order to discuss the "warmth" of nylon socks. This topic, in our opinion, is of fundamental importance. Socks knit of spun nylon yarns are warm. This, of course, refers to socks of a construction normally used for other hosiery fibers when warm socks are desired. The reason that socks from spun nylon yarns are warm is not as a result of the chemical nature of the fiber, but is a result of the mechanical structure of the yarns and fabric knit therefrom. We refer to the crimp in the staple which, as mentioned before, imparts loft to the yarns. It has been proven during the past few years that by far the major effect in insulation properties of a fabric is its thickness and enclosed air space. The air space in a fabric is so important that the fiber itself is completely secondary as far as insulation properties are concerned. To illustrate this point, laboratory tests on spun nylon fabrics and equivalent construction wool fabrics show that their insulation properties are essentially the same. In one instance, the nylon fabric was slightly warmer according to the test and in another instance, the wool control was slightly warmer. The differences were slight.

Fabric knit of spun nylon yarn maintain their loft and thickness during wear and washing which is essential for continued good performance as a "warm" fabric. This ability of nylon staple to give thickness to a fabric and not become matted is also the reason why nylon socks are comfortable with respect to "cushioning" and moisture pick up. Nylon socks absorb moisture from the feet satisfactorily because of the air spaces in the fabric. A sock from spun yarns absorb much more moisture than those from continuous filament yarns. Also, the rate of evaporation is sufficiently high in the case of a properly constructed spun nylon sock to give comfort.

We wish to emphasize that as in the case of wool, the proper size filament staple must be employed to get the best results. For this "cushioning" effect, high denier staple gives better results than low denier staple. We do not say that nylon feels like wol, cotton, or rayon. We definitely say that it feels like a spun nylon fabric which has positive merits of its own and is comfortable.

PROPERTIES—APPEARANCE.—From a purely functional or technical standpoint, spun nylon socks are, we believe, very satisfactory because of their durability, shrinkage resistance, and comfort. The hosiery manufacturers are very conscious of appearance and rightly so. Well, do nylon socks have good appearance? The most direct manner to respond to this question is to call your attention again to these samples which the knitters kindly consented to let us display. We believe that the appearance of spun nylon socks is good and that they will have customer appeal. Let me reiterate, perhaps a nylon socks does not look like a wool sock or a mercerized sock or a rayon sock. These items look like nylon socks and will stand on their own merit.

KNITTING.—It is apropos of this talk to say a few words about the knitting of nylon socks. Actually, there are no particular precautions to be taken. In general, nylon yarns can be knit very readily into a satisfactory product. However, it is generally advisable, based on some of the experiments conducted by knitters, that as low tension as possible and as loose stitch as possible be used in knitting nylon yarn to obtain the best products therefrom. For some socks, it has been found that nylon yarns differ in actual size from wool or worsted yarn in the same count, consequently, the knitter must experiment to determine the proper nylon yarn for the fabric desired. Too heavy a yarn gives a hard and boardy hand while a yarn which is too light makes the fabric very sleazy.

Suggested yarn counts for various types of knitting machines are given in Table IV. These suggested counts are mentioned only to serve as a basis for further experiments by knitters, and were used in satisfactory experiments previously.

DYEING AND FINISHING. — Good wash fast dyes can be used on hosiery knit of spun nylon yarns. These dyes are usually acid type dyes. It is our suggestion that the hosiery manufacturer talk with his dyestuff suppliers concerning any problems which might be encountered. The dyestuffs companies have had experience in dyeing spun nylon products. Dyeing is very satisfactory today in general and also we do know that improvements will be made continuously as nylon staple is a new fiber.

In the finishing of spun nylon half hose, it has been found that it is not necessary to preboard them for shape retention. Preboarding is a setting operation applied to nylon fabrics usually with high pressure steam. In the case of ladies' full-length hosiery, for example, this preboarding or setting operation prevents the formation of permanent wrinkles during dyeing and finishing and makes the producte dimensionally stable. In addition to steam, nylon can be set by dry heat, as well as with various combinations of time, moisture, and temperature.

Preboarding of spun nylon socks has been done to give a "finished" appearance to the hose for counter appeal. There have been some indications that it will not be necessary to preboard socks knit of spun nylon yarn, and work is continuing to determine if elimination of preboarding is feasible. In any case, however, it is not necessary to preboard heavy or athletic type socks unless cushion soles are used. With cushion soles, preboarding increases appreciably the crush re-

TABLE IV

Machine	*Yarn Count*	*Ends*
200 Needle Komet	1/40 W.C.	2
132 Needle Komet	1/20 W.C.	2
160 Deedle HH (Men's)	1/30 W.C.	2
160 Needle HH (Ladies')	1/18 W.C.	1
108 Needle HH	1/18 or 1/20 W.C.	2
42 Gauge Full Fashioned	60/2 cc	1

sistance of the terry yarn.

The finishing of socks is an operation which varies with each finisher and they have done a very creditable job. Actually, the work on optimum finishing of nylon half hose has really just begun since the staple fiber is such a new product. To date the accepted methods in finishing wool and cotton socks have been used in general for nylon socks. There are very probably other finishing methods which are better. For instance, there are positive indications that a dry-heat treatment gives spun nylon products an improved hand. One suggestion on the finishing of nylon half hose is that as much tumbling and washing be given as possible. This definitely improves the hand and feel of the nylon sock. It is well known that the hand of nylon knit goods improves with washing.

Conclusion

Real progress has been made by the cooperative efforts of spinners, knitters, and finishers in developing socks of spun nylon yarns and the future appears most promising.

I have enjoyed bringing this picture of a nylon development to you and hope it will be of value in your work.

Thank you.

Discussion

Mr. Hultberg: In making a nylon sock which we substituted for a wool yarn, the finished sock didn't seem to have the stretch that the wool sock had. What would be your answer to that?

Dr. Vincent: One reason is that spun nylon yarn has to be treated pretty much as filament yarn, in that you have got to operate under as low tension as possible all the time. What was the yarn count?

Mr. Hultberg: We started with the equivalent yarn count, but of course, we realize that yarn count is weight, and the machines go by volume, so we tried a size both above and below the wool count; and we don't get the stretch with the 100 per cent nylon that we got out of the 100 per cent wool. And we also had the same type in 50 per cent wool and 50 per cent spun rayon, and that has apparently had approximately the same stretch as the all wool; and the 100 per cent nylon the least stretch.

Dr. Vincent: What denier was it?

Mr. Hultberg: I think it was one and a half denier, although I am not positive. We had a number of different kinds, and I am not sure what that was.

Dr. Vincent: Well, here is a sock, 132 needle, which seems to be very good in this respect. In your particular case I just don't know the answer, if you have tried various yarn counts and worked under low tension and loose stitch. Were they preboarded?

Mr. Hultberg: We did it both ways. I think the time they were not preboarded they were more elastic than when they were preboarded.

Dr. Vincent: Preboarding probably shouldn't be used in an athletic sock.

Mr. Hultberg: Incidentally, it may feel as though the preboarding shrinks it a little bit, but if you make wash tests on the socks after wear, the ones that were not preboarded will shrink, and the total shrinkage will be approximately the same. In the one case you shrink it in the washing.

Dr. Vincent: Yes. That is a point which in the case of dress socks is not absolutely settled. I mean it may be necessary to preboard them because of that very fact. After we are through here I can show you some socks which do have very good elasticity. That problem of low elasticity has been with use from the beginning, but the socks which have been made recently are very good in that respect. Low tension in knitting and right yarn counts are the answers.

Mr. Hultberg: This particular yarn was made by a cotton spinner. We have had some made by a worsted spinner that were better.

Dr. Vincent: Long draft, I suppose?

Mr. Hultberg. Yes.

James Raocrt: That fiber was crimped, wasn't it- And when you pre-set it in the preboarding machine, what happens?

Dr. Vincent: We have noticed no difference in the permanence of the crimp, with or without preboarding. In the case of sweaters, for instance, which have been tested, one set preboarded and one not, the appearance of the sweaters as far as fullness was concerned was just about the same after wear and washing. Preboarding does not seem to affect this crimp.

I neglected to pass around some of this nylon yarn. If any of you care to come up later on and inspect it, you are welcome to do so.

Mr. Walters: As long as we are on nylon I would like to present an open question regarding the mixing of merges of nylon, and it would probably pertain to this also, in the dyeing of mixed merges of nylon and full-fashioned hosiery. In other words, in overcoming the light and dark affinity of the dye, having a different dyeing index, it seems like quite a few of the full-fashioned mills are getting careless about mixing merges of nylon and we are running into quite a bit of light and dark nylon either in the same stocking or in various stockings in the same lot. I just wondered if you have any ideas on overcoming this.

Dr. Vincent: Frankly, I am not in a position to give you much help on that I myself have very little to do with the filament end of it. But I certainly will report your comments.

Mr. Walters: I imagine it would show up the same way in a light colored hose such as you have there in the yellows and light pinks.

Chairman Siegrist: Aren't you talking chiefly of continuous filament?

Mr. Walters: No; more or less in the mixtures of merges of nylon.

Chairman Siegrist: That wouldn't have any special bearing on spun nylon, would it?

Mr. Walters: Well, if the various merges of spun nylon were mixed, you would get a definite muddled effect on the final dyeing.

Chairman Siegrist: I don't think so. I don't think the variation is great enough to show up in a spun fiber. Maybe I am wrong. What do you think about that, Dr. Vincent?

Dr. Vincent: We have never run across that. When you go into spun nylon, many of the problems are immediately eliminated. Some of the problems in continuous filament nylon were tied up with the individual package variation of differences from the inside to the outside. With spun it is all blended in. We never have yet run across that sort of thing with spun.

Mr. Walters: Possibly due to the even blending?

Dr. Vincent: I believe that is it, because acid dyes, for instance, can be used very well with spun nylon.

All address changes should be sent to the National Secretary

TRADE NOTES • NEW PRODUCTS

• Officers, Mathieson Chemical

The Board of Directors of Mathieson Chemical Corporation (formerly The Mathieson Alkali Works) announced recently the election of Thomas S. Nichols

Thomas S. Nichols

George W. Dolan

John C. Leppart

as President and Chief Executive Officer. George W. Dolan, formerly President, was elected Chairman of the Board. A. U. Fox, former Chairman, resigned. John C. Leppart was elected Vice President.

Officers re-elected are A. T. Bennett, Vice President-General Manager of Operations; Howard Berry, Vice President and Treasurer; D. W. Drummond, Vice President-General Manager of Sales; J. V. Joyce, Vice President and Comptroller; E. E. Routh, Vice President-Director of Sales; and A. P. Winsor, Secretary.

• Joins Interchemical Coatings Department

Albert J. Capalbo, well known plastic coatings technician, who has joined the Flexible Plastic Coatings Department of Interchemical Corporation's Finishes Division, according to a recent announcement by Chester M. Robbins, head of the department.

Mr. Capalbo, who received his technical training in chemistry at the Newark Technical School, Newark, N. J., brings to Interchemical a background of more than twelve years in the manufacturing and printing of flexible plastic coatings. He recently completed two years as chief chemist for the Plasticote Fabrics Corporation of Passaic, N. J., formerly manufacturers of coatings for textiles and specialists in vinyls.

In his work with the Flexible Plastic Coatings Department of Interchemical Corporation's Finishes Division, Mr. Capalbo will serve in both a sales and technical service capacity with headquarters in Elizabeth, N. J.

• Philadelphia Alumni, LTI

At a reunion held by a group of alumni of Lowell Textile Institute at Kugler's Restaurant, Philadelphia, on March 5th, it was decided to meet probably once a month and, at a later date, form an active LTI Alumni group in the Philadelphia area.

A subsequent meeting was held on April 6th at Kugler's restaurant at which time Robert Lamont, Vice President of L. F. Grammes & Sons, Inc. of Allentown, Pa., gave a very interesting talk on commercial etchings. Mr. Lamont had samples of the etchings in their various stages and an enjoyable discussion followed his talk. Edgar Beigbeder acted as chairman and E. J. Donohoe is handling the necessary correspondence for the group.

The next meeting is scheduled for May 11th at Kugler's Restaurant and at that time Colonel H. M. Manderbach of the Philadelphia Quartermaster Depot will address the group.

It is requested that any persons who attended LTI, whether or not they graduated, and who live in the Philadelphia area, contact Mr. Donohoe if they wish to attend the meeting. He may be reached at the United States Testing Company, Inc., 601 West Susquehanna Avenue, Philadelphia 22, Pa. In order that an accurate mailing list may be prepared it is requested that those who do not plan to attend send their correct addresses to Mr. Donohoe.

• Delegates to England

The United States will be represented at the first meeting of the committee on textiles of the International Organization for Standardization (ISO) at Buxton, England, June 7 through 12, Vice-Admiral George F. Hussey, Jr., USN (Retired), secretary of the American Standards Association, has announced. Delegates have already been named by the American Association of Textile Chemists and Colorists, the American Council of Commercial Laboratories, the American Society for Testing Materials, the National Bureau of Standards, the National Federation of Textiles, and the National Retail Dry Goods Association. They will act as representatives of the American Standards Association, which is the United States member of the International Organization for Standardization.

A meeting of the delegates will be held April 23 to discuss plans for the meeting.

The delegates appointed up to the present time are:

Dr. W. D. Appel, Textile Section, National Bureau of Standards, Washington, D. C.; appointed by the National

Bureau of Standards.

Professor H. J. Ball, Lowell Textile Institute, Lowell, Massachusetts, chairman of ASTM Committee D13, on Textile Materials; appointed by the American Society for Testing Materials.

J. R. Bonnar, technical director, General Dyestuff Corporation, New York, N. Y.; appointed by the American Association of Textile Chemists and Colorists.

D. E. Douty, chairman, Board of Directors, U. S. Testing Company, Hoboken, N. J.; appointed by the American Council of Commercial Laboratories and the National Federation of Textiles.

Julius B. Goldberg, J. P. Stevens and Company, New York, N. Y.; appointed by the National Federation of Textiles.

William Shear, president, Leo Shear and Company, Inc., Evansville, Indiana; appointed by the National Retail Dry Goods Association.

The Textile Section of the New York Board of Trade has announced that it will be represented, but has not as yet named its delegates.

Vice-Admiral George F. Hussey, Jr., secretary of the American Standards Association, will also attend the meeting as a delegate.

• Arnold-Hoffman Acquires Cincinnati Plant

Arnold, Hoffman & Co., Incorporated, of Providence, Rhode Island, has announced the acquisition of the business of the Harkness and Cowing Company of Cincinnati, Ohio.

The new Arnold, Hoffman unit will continue to serve its present accounts and there will be no changes in the personnel of this Division. Arnold, Hoffman also announces the election of Wilder H. Haines, of Boston, Massachusetts, as a Director, formerly a director of Harkness and Cowing; Rufus A. Healy, a Vice President and Clarkson Taylor, Assistant Treasurer.

The business of Harkness and Cowing Company was founded in 1855, and has long been established as a manufacturer of high grade stearic acid, red oil and crude glycerine. Production will be increased to meet all Arnold, Hoffman demands, and to continue to satisfy the regular Harkness & Cowing accounts.

Availability of this Cincinnati outlet will enable Arnold, Hoffman to serve the Middle Western United States better than has been possible heretofore from Providence, Dighton or Charlotte. In addition to increasing fatty acid production, it is expected that the Harkness & Cowing Division will soon produce other chemicals, particularly those which are at present difficult or impossible to ship economically from the East to the Middle West.

• Appointed Technical Director

Interchemical Corporation—Textile Colors Division, Fair Lawn, N. J., announces the appointment of Arthur Booth, above, as Technical Director of its Aridye Dispersions Department. Mr. Booth joined the Textile Colors Division (then Aridye Corporation) in 1942 and for the last three years has been in charge of research and development work on Aridye Pigment Colors and Clears. He is the inventor of several products and processes relating to the pigment printing and dyeing of textiles. After his graduation from Newark College of Engineering, Mr. Booth went with Petroleum Derivatives Corporation as chemist and later as Assistant Director of Research. Subsequently he was associated with Dr. James J. Mackey as a consulting chemist to the textile industry. From 1932 to 1942 he was Head of the Department of Textile Chemistry, Dyeing and Printing, Paterson Vocational High School. Mr. Booth is a member of the American Association of Textile Chemists and Colorists.

• Textile Photo Exhibit

A traveling photo exhibit, presenting a pictorial story of the cotton textile industry was previewed recently by textile news writers and editors at a luncheon sponsored by the Textile Information Service at the Henry Hudson Hotel. The exhibit, which is made up of pictures from many different mills and mill communities, both North and South, was designed and edited by the Information Service. Pictures were taken either by its own photographers or secured from mill or trade association sources.

The exhibit will be placed on display for the first time at the annual meeting of the American Cotton Manufacturers Association in New Orleans. From there it will be shipped north for an early showing in New England and thereafter will be available for exhibition at schools and public centers in both mill and non-mill communities.

While previewing the exhibit, the newsmen also inspected the complete photo library of the service. This collection of news and feature photographs covering subjects directly related to the cotton textile industry numbers well over 500 prints, all of which are available for use by newspapers and magazines.

The Information Service, which is now in its second year of operation, is directed by the Cotton Textile Industry-Wide Committee on Public Relations and is supported by a major part of the industry.

• Joins Textile Printing

Vincent J. Barry, formerly a laboratory chemist for the Windsor Print Works in North Adams, Mass., is now employed as an assistant chemist by the Textile Printing Company of Warren, Inc., at Bondsville, Mass.

• Hatch Price List

Herbert H. Hatch, Director of Hatch Textile Research, 25 East 26th Street, New York 10, N. Y., has announced publication of a new price list which is available upon request. Slight upward revisions in prices are shown on about one-third of the tests. Since 1926, prices have been raised only twice, the previous revision having been made on September 15, 1946.

May 1, 1948 marks the twenty-second anniversary of the laboratory. During the past year the personnel has been increased and considerable modern equipment has been added. Mr. Hatch will soon mark his fortieth anniversary in this field of endeavor.

• 50th Anniversary, Philadelphia Office, Stein, Hall

The Philadelphia office of Stein, Hall & Company, Inc., will be fifty years old on May 4th of this year. Under the managership of Elliott I. Stokes during the past 10 years, this office has steadily grown in size, and services today a large number of industrial enterprises located in Pennsylvania, Maryland, Delaware, New Jersey, West Virginia and Washington, D. C.

The Philadelphia office was the first of the nation-wide net-work of branch offices established in the 82 years of Stein, Hall & Company's history. It was originally headed by Harry M. Saffer; Mr.

Stokes assumed his position as head of the office upon the death of Mr. Saffer in 1938. Mr. Stokes joined the Boston office of the Stein-Hall organization in 1911 and was transferred to the Philadelphia branch in 1919 after service in the first World War. Today he directs the activities of a staff of 9, including 5 salesmen. The Philadelphia office merchandises most of the products handled by Stein-Hall & Company.

• Appointed Asst. General Manager

Percy C. Gregory, Jr., Assistant General Manager, Union Bleachery, Union, S. C., has been appointed to succeed Herbert Mathewson, General Manager, who has resigned to join Springs Cotton Mills.

• Clear Flo Starches

A new type of starch, Clear Flo, swelling at considerably lower temperatures than ordinary starches, and which is said to give clear, stable, and unusually viscous pastes has just been announced by Dr. C. G. Caldwell, Coordinator of Research for National Starch Products Inc.

Available in both high and low viscosity grades, it is stated that Clear Flo starches are easily prepared by merely adding hot water to a suspension of the starch in cold water. The pastes obtained ranged from opaque to very clear depending upon the temperature of the water used. The unusually high water-taking ability of Clear Flo starches permits considerable dilution with but slight loss of body. Among uses suggested for the Clear Flo starches as thickening, binding, or dispersing agents are in textile finishing and sizing.

The similarity of many of the properties of the Clear Flo starches to those of carboxymethyl cellulose suggests many other uses.

National has applied for patent protection covering the new line of Clear Flo products, which has been developed over a period of several years.

Research samples of the Clear Flo starches can be obtained from National at 270 Madison Avenue, New York 16, N. Y.

• Patent Abstracts, 1935-38

The New York Public Library has prepared and catalogued a microfilm under the title of "Wengraf Berichte, 1935-1938." These reports contain abstracts of U. S. and foreign patents and U. S. and foreign periodicals regarding progress in textile chemistry during these years. The scheme of subdivision of the subject matter is identical with that set forth in the AMERICAN DYESTUFF REPORTER of July 1st, 1946, page 335.

• V. P. and General Sales Manager

John Lewis Perkins, III, who has been appointed vice-president and general sales manager of B. F. Perkins & Son, Inc., Holyoke, Mass. This business was founded by his great grandfather in 1873 and is celebrating its Diamond Jubilee year.

Mr. Perkins was born in New York City, February 8, 1920. Following his graduation from Taft School, Watertown, Connecticut, he matriculated at Worcester Polytechnic Institute and withdrew two years later to join the United States Army Air Forces where he was commissioned a lieutenant and served as an instructor because of his technical knowledge and flying experience.

• U. S. Testing Booklets

The United States Testing Company, Inc., 1415 Park Avenue, Hoboken, New Jersey, announces that they have available the following booklets which will be sent without charge on request:

Testing Price List—which tells of the various tests made by the company and shows the scope of its activities.

Your Guide to Wise Buying—a booklet on informative labeling, its value to the producer, and the Certification Plan of the company.

Core Testing for Determination of Wool Yield and Shrinkage—which explains this method for determining the shrinkage or yield of grease wool, carpet wool or pulled wool.

Testing Terms for Better Understanding—a bulletin dedicated to better understanding of some of the important tests of merchandise, how they are made, what the results mean, and minimum specifications.

Testing in Modern Industry—a bulletin which describes the services of the company, and gives various useful tables of equivalents, conversion factors, and other data useful to textile mills.

• Appointed Technical Representative

Interchemical Corporation—Textile Colors Division, Fair Lawn, N. J. announces the appointment of S. Y. Stribling, III, as Technical Representative with headquarters at the Rock Hill, S. C. office. Following his graduation from Georgia School of Technology in 1934, Mr. Stribling went with Southern Bleachery and Print Works. In 1945 he joined theTextile Colors Division (then Aridye Corporation) and for the last several months has been in charge of the Application Laboratories in Fair Lawn. Mr. Stribling is a member of the American Association of Textile Chemists and Colorists and Phi Psi, Honorary Textile Fraternity.

• Guide to Infrared Applications

Radiant heat processing for metal-working, plastics, textile, leather, graphic arts, paper, food, woodworking, building, glass and bottling, rubber and other industries are described in a new booklet "Modern Baking, Drying, Heating With Industrial Infrared Lamps" announced by the Westinghouse Electric Corporation. The 16-page booklet discusses the four major types of installations—the portable or non-oven type, the single-walled oven, the double-walled oven, and the insulated oven. Application data to aid in planning installations is included.

Copies of the booklet (A-3817) may be secured from Advertising and Sales, Westinghouse Lamp Division, Bloomfield, N. J.

• du Pont Appointments

The Du Pont Company announced recently the appointment of William T. Wood as director of production of the Nylon Division of the Rayon Department, succeeding W. E. Gladding, who has been transferred to special assignment for the Nylon Division Management.

Mr. Wood has been director of production of the Acetate Division.

Simultaneously, it was announced that M. G. Jones, manager of the Waynesboro, Va., plant becomes director of pro-

duction of the Acetate Division, and Thomas Taylor, of the Spruance plant, Richmond, Va., succeeds Mr. Jones at the Waynesboro plant.

• Mathieson Chemical Corp.

The Mathieson Alkali Works, after having been known by that name for 56 years, announced on March 30th that its stockholders had approved a change in name to Mathieson Chemical Corporation. The company was established in 1892, when a group of American businessmen decided to produce alkali and bleaching powder in this country. At that time, most of the former product and all of the latter were imported. The services of Thomas T. Mathieson, member of an English alkali manufacturing family, were obtained to supervise the construction of a plant and its initial production. Mr. Mathieson brought with him 50 skilled workmen and technical men to Saltville, Va., the site selected for the first plant. The American owners also acquired use of the Mathieson name and Eagle-Thistle brand, already well-known in the United States.

From that beginning the company has grown to its present size with additional plants at Niagara Falls, N. Y., and Lake Charles, La., with gross assets, before property depreciation, of over $60,000,000, and with a production capacity of over 600,000 tons of basic chemicals annually. Distribution facilities include warehouses located in sixteen cities and a fleet of nearly 1,000 special railroad cars, part owned and part leased. The number of employees has grown to more than 3,000.

The operations at Saltville led eventually to the production of bicarbonate of soda, dry ice and liquid carbon dioxide, in addition to the basic chemicals, caustic soda and soda ash.

Almost immediately after starting operations at Saltville, the company obtained the rights in this country to the use of the Castner electrolytic cell for producing caustic soda and chlorine. After experimental installations were tested at Saltville, a plant was built at Niagara Falls, N. Y., where the abundant, low-cost power needed for the process was available. This plant was operated as the Castner Electrolytic Alkali Company until 1917 when it was merged with the parent company.

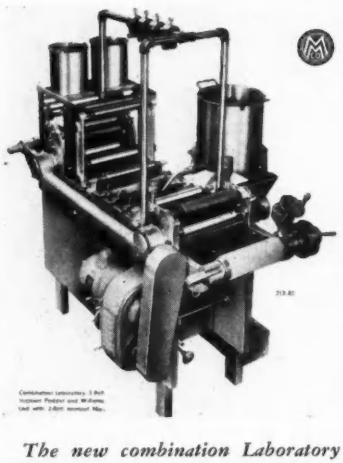
In 1923, Mathieson introduced synthetic ammonia, the first commercially produced in the United States. The process, which grew out of the company's wartime experiments in nitrogen fixation, utilized nitrogen from the air and the hydrogen by-product of the mercury cells at the Niagara Falls plant. It proved so efficient that practically all the ammonia now manufactured in the country is produced synthetically.

In 1930, the company started to survey the growing industry of the deep south and southwest, and a site for a new plant was finally chosen at Lake Charles, La. The plant was completed in 1934, another unit making caustic soda and soda ash.

During World War II, Mathieson built and operated an ammonia plant for the government at Lake Charles, and has since leased it. Here synthetic ammonia is produced from natural gas.

The company's research laboratories at Niagara Falls are largely responsible for the product diversification behind the change of name. True calcium hypochlorite, a dry powder used principally for small-scale chlorine disinfecting and bleaching, was introduced in 1928. Sodium chlorite, commercially introduced just before the last war, is used as a bleaching agent in the manufacture of textiles, paper, flour, oils and fats, and other materials, and to remove objectionable tastes and odors from public water supplies. Sodium methylate in powder form was made commercially available during the war and helped make possible the large wartime production of sulfa drugs. Latest major development is a "stationary" mercury cell (as compared to the Castner "rocking" cell) for production of concentrated caustic soda and chlorine.

• New Laboratory Unit



The new combination Laboratory 3-Roll Microset Padder and Williams Unit with 2-Roll Microset Nip shown above is said to be not only an ideal unit for research and development work, but also offers a wide range of uses in practical application.

Designed and engineered by the Morrison Machine Co., of Paterson, N. J., this new machine combines a Williams Unit which is only about one-third the size of the standard unit, with a 3-Roll Microset Pad and a 2-Roll Microset Nip. According to the inventor, S. H. Williams, this equipment offers many advantages in practical application.

This new laboratory unit, having 12-inch face rolls, may be used for dyeing of all classes of dyestuffs on all forms of textile materials up to 10 inches in width.

Other practical applications include the dyeing of yarn in warp form; the dyeing of narrow fabrics such as ribbons and tapes; and it is also suitable for use in connection with desizing operations.

According to the inventor, the reproduction of shades and effects with this equipment will duplicate very closely practical mill results obtained on larger machines.

When used for research work, this machine provides a means of investigating methods and procedures correlated to plant application. Laboratory technicians, chemists, colorists, and dyers are finding large scale use for this new equipment for studying their problems, since it is said to eliminate tying up of productive plant equipment, and save many production hours in the investigation of dye formulas and the dyeability of various constructions.

• Course on Testing

As a contribution to education in textile development, the United Statest Testing Company will give its Tenth Annual Refresher Course in Textiles and Testing Techniques, July 12 to July 30. James Giblin, head of the Textile Design Department, of the New Bedford Textile Institute, will have harge of the classes which are open to teachers in home economics, graduate students of textile schools, retail executives, personnel directors, etc.

This summer course of lecture demonstrations and practice follows the five major divisions of the Company's activities: chemistry, engineering, bacteriology, microscopy and physical testing. The students actually work with the Company's technicians. Special emphasis this year will be given to various processes of finishing and dyeing fabrics. The regular classes cover all phases of the textile industry.

According to Mr. Giblin, fourteen states, including California, Oregon and Utah are already represented in the enrollment. Last year students from India and Alaska attended. There is a nominal charge for the Refresher Course, most of

the expense being borne by the Testing Company as a practical method of presenting new developments to educators.

• Director of Research, Monsanto

Appointment of Dr. Frederic Matthews of Winchester, Mass., as director of research for the Merrimac division of Monsanto Chemical Company was announced at Everett, Mass. recently by Josiah B. Rutter, Monsanto vice-president and Merrimac general manager.

Dr. Matthews succeeds W. S. Wilson of Brookline, outstanding authority on paper chemicals, who will be free to devote full time to special research projects in the paper chemical industry and allied fields.

• Lectures to Students

On Thursday evening, March 18, 1948, William D. Baird was the chief speaker at a lecture given to students at the Philadelphia Textile Institute.

The discussion was held in the auditorium of the school and the topic was "Practical Dyeing of Napthols and Related Products."

After briefly dwelling on the origin and history of Napthols, Mr. Baird launched into a practical discussion of the types of equipment normally used, various methods of application and various combinations to obtain certain shades.

Fastness specifications of the Napthol group were discussed and in particular the avoidance of crocking by proper finishing procedure was dwelt on. The use of Stabilon, an auxiliary product, was claimed to be of great value in reducing crocking or rubbing off of color on adjacent white yarn or goods.

After the lecture a question and answer period took place.

The talk given by Mr. Baird, who is chief application chemist for American Aniline Products, Inc., of New York, is in line with the company's policy of lecturing on the practical aspects of dyeing, printing and related methods of dye application to interested textile schools throughout the country.

• Ultrasol Coating

Production of a new economical vinyl resin coating combining flame-resisting qualities with exceptional abrasion and weathering characteristics was announced recently by Monsanto Chemical Company. The announcement of the new product, named Ultrasol, was made by Josiah B. Rutter, Monsanto vice-president and general manager of the company's Merrimac Division.

Ultrasol-coated fabrics are similar in appearance to the more common nitrocellulose-treated products. Applied to paper or fabric, it is said to give either a smooth, colorful finish or a decorative leather-like effect. It is equally effective in bright colors or pastel shades.

• 50 Years in Dyestuff Business

Sidney R. David, who on April 25th completes 50 years in the dyestuff business. Mr. David has been a familiar figure to many in the dyestuff and textile fields and states that he has enjoyed very much his fifty years in the business, has met a good many very nice people, and has made many interesting friendships. Mr. David is in excellent health and expects to keep going quite a few more years.

Mr. David contributed an article concerning some of his experiences for the Silver Jubilee Issue (December 2, 1946) entitled "Thoughts: Idle and Otherwise" which proved to be very interesting.

• Permel Resin Finish

The American Cyanamid Company's Textile Resin Department has announced its entrance into the durable water repellent field with the introduction of its Permel Resin finish for cotton, wool, corduroy, and synthetic fabrics. Among other advantages, Cyanamid's new repellent is said to be free from troublesome or unpleasant odor during the finishing operations.

Permel Resin is a durable water repellent compounded to give maximum repellency, both initially and after standard launderings and dry cleanings. It is stated that the finish has been tested and approved as a durable water repellent by the U. S. Army Quartermaster.

The Permel finish can be combined with other resins to obtain multi-finishes in one bath. It was pointed out that a durable spot resistance and crease resistance is economically obtained on rayons when Permel is used with the crease proofing resins in a single bath. Permel Resin, by itself, is said to impart some shrinkage control to cellulose fabrics. The shrinkage control can be magnified by adding the thermosetting resins Aerotex Cream 450 or Aerotex Resin M-3 to the impregnating bath. In treating cotton, where shrinkage control is usually important, water repellency plus shrinkage control can be obtained by a proper formulation of resins in the same bath.

No special equipment is needed to process fabrics for water repellency or for the multi-finishes since the normal mill impregnating equipment of padders, driers, and cure boxes is used.

It is stated that the finish, as well as yielding a fabric with a high degree of repellency, will also protect garments from water-soluble stains due to spilling of ink, milk and beverages.

It is claimed that, when treated with Permel Resin, correctly designed cotton fabric will give spray rating by the AATCC Spray Test of:

Cloth Treatment	*Spray Test*
Initial	100
After three launderings	80-90
After three dry cleanings	80

Dynamic absorption, according to the Quartermaster Corps Tests, which runs as high as 100 per cent on untreated fabrics, is said to be below 30 per cent, either initially or after three launderings, or after three dry cleanings.

The hand will not be materially different from the untreated cloth and there is only a minimum effect upon dyestuffs except on those susceptible to formaldehyde.

Permel Resin is readily pasted and is said to easily go into an excellent dispersion. There is no odor in the bath and practically none during curing.

The curing of Permel Resin is said to be readily accomplished either in the same chamber as the main drying or in a separate chamber. Temperatures in excess of 275° F. must be used for curing.

• Monsanto Appointment

James A. Wilson, plant manager at the headquarters of Monsanto Chemical Company's Merrimac Division at Everett, Mass., has been appointed production manager for the division, it was an-

nounced recently by J. B. Rutter, general manager of the division. The appointment is effective immediately.

Wilson is being succeeded as plant manager by Russell L. Miller, plant superintendent.

• Bulletin on Onyxsans

Onyx Oil & Chemical Company, Jersey City 2, N. J. has issued a new bulletin (TX-1) on the Onyxsans. The first Onyxsan bulletin was published several years ago when the product was quite new. The present bulletin has been prepared to bring the textile field up-to-date on the improvements in the Onyxsans which have been produced later and to make more understandable the theory and applications of this line of cationic softening agents. Copies are available upon request.

• Unifast Process

The United Piece Dye Works announces the adoption of the name Unifast for its vat-dyeing and special finishing process. Designed to meet the critcal quality standard of today's market, Unifast-processed fabrics are claimed to be wash-and-light fast, shrinkage controlled, perspiration resistant and permanently crease-resistant.

They are said to withstand 40 to 60 hour light-fastness tests and meet, or exceed, commercial laundry requirements. It is stated that the crease-resistant finish, which adds body and "hand" does not wash out and lasts the life of the garment.

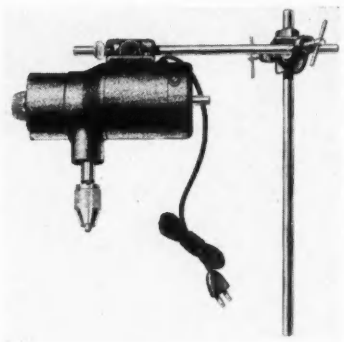
While Unifast is suitable for fabrics composed of filament and spun rayon yarns of viscose, viscose-and-acetate, viscose-and-cotton, it is especially well adapted for use on spun rayons.

• Appointed to Managerial Posts

S. Carroll Young, William C. Kastner, and Gerhard A. Wolff have been appointed to managerial posts in the General Aniline Works Division plant of General Aniline & Film Corporation, at Linden, it was announced recently by Plant Manager Russell I. Baker. The appointments were made as reorganization measures made necessary by the death of Industrial Relations Manager, James M. Cunningham, an executive of the Linden plant since its establishment 33 years ago.

Mr. Young, who assumes the post of Industrial Relations Manager, headed a section of the Vat colors department for the past five years. He has devoted more than 20 years to the research, production and personnel problems of the chemical industry. Mr. Kastner, who becomes manager of the Transportation and Warehouse departments, has been identified with the Linden plant for 25 years, as assistant to Mr. Cunningham, chief clerk and cost accounting supervisor. Mr. Wolff, named Personnel Manager, has been engaged in personnel and labor relations work at the Linden plant for more than 11 years.

• Laboratory Stirrer



In order to meet widespread laboratory demands for a more powerful stirring device, Baker Instrument Co., 17 S. Day St., Orange, N. J., is offering the new high-power stirrer of unusual design shown above.

High torque is obtained from a universal type 1/15 H.P. motor, which delivers 10,000 R.P.M. to armature shaft (without load). A second shaft is geared down to deliver a speed of 900 R.P.M. The propellor attaches to either shaft by means of a Jacob's 3/8" chuck. Optional rheostat control gives continuous speeds to 900 R.P.M. on one shaft, to 10,000 R.P.M. on the other.

The company is now preparing a bulletin on the stirrer.

• Elected to Executive Committee, NETF

Joseph H. Axelrod, President of Airedale Worsted Mills, Crown Mfg. Co., and Lippitt Worsted Mills was recently elected to the Executive Committee of the New England Textile Foundation (68 South Main St., Providence) to succeed Harold W. Leitch, Research Director of Pacific Mills, Worsted Division, whose term expired December 5, 1947. Mr. Axelrod will serve until December 5, 1952.

The election of Mr. Axelrod fulfills the recently established policy of the Industry Committee of the Foundation that no member of the Executive Committee shall succeed himself nor be officially connected with any textile school.

The Foundation considers itself fortunate in obtaining the services of Mr. Axelrod because of his prominence in the textile industry and his lively interest in textile affairs of New England.

• Purchase R. I. Felt Company

Announcement has been made by the American Felt Company that it has purchased the Rhode Island Felt Company, which has been operating at Westerly, R. I. for a number of years. It will be called the Westerly Mill of the American Felt Company and will manufacture white goods only. The company's main plant is at Glenville, Conn., and its three others are located at Newburgh, N. Y., Franklin, Mass. and Detroit, Mich.

OBITUARY

RICHARD B. FEIBELMANN

DR. RICHARD B. FEIBELMANN, 64, internationally known figure in the textile and paper industries, died in Port Jervis, N. Y., March 25. He would have been 65 years of age on May 8.

Born in the Bavarian Palatinate in Germany, he was educated in the Karlsruhe High School and the University of Munich, where he obtained his degree as Doctor of Philosophy in Organic Chemistry. He then entered on a teaching career, serving both at the University of Munich and the University of Strasbourg.

He entered industry at Goerlitz, Germany, serving as a research chemist, and then served in the research laboratories of another German chemical concern at Radebeul from 1911 to 1923. In 1923 he became manager of the Pyrgos Chemical Company, manufacturers of textile and paper chemicals, and remained with that company until the fall of 1935 when he came to the United States.

Shortly after his arrival in the United States, Dr. Feibelmann became affiliated with the Aktivin Corporation, a wholly owned subsidiary of Heyden Chemical Corporation. During this period he developed starch solubilizing processes for use in the textile and paper finishing industries which are basic to those industries.

He was General Manager of the Aktivin Division of Heyden Chemical Corporation until shortly before his death.

He was a member of the Inernational Textile Colorists Association, American Chemical Society, Technical Association of the Pulp and Paper Industry, and American Association of Textile Chemists and Colorists.

Dr. Feibelmann leaves his wife and a daughter.

• Texas Representative, Stein-Hall

Stein, Hall & Company have appointed Joseph T. O'Neill as their sales representative for Texas. Mr. O'Neill, who was previously connected with the New York office of Stein-Hall, will make his headquarters in New Orleans, at the Stein-Hall office in that city, 413 Pere Marquette Bldg.

• Report on Fungi

Methods developed for preventing damage to military equipment by fungi and results of a study on the effects of water repellents on the efficiency of fungicides are contained in a research report now on sale by the Office of Technical Services, Department of Commerce.

The report, prepared by H. C. DeHoff and M. B. Leggett, describes experiments at the Chemical Warfare Service Development Laboratory of the Massachusetts Institute of Technology at Cambridge. Although developed for use with Army equipment, the methods are applicable to any commercial product of the same category.

Copies of the 48-page report (PB-86357; *Fungicides with water repellents for plant and field use)* are available in microfilm at $2 and in photostat at $5. Orders for the report should be addressed to the Office of Technical Services, Department of Commerce, Washington 25, D. C., and should be accompanied by check or money order payable to the Treasurer of the United States.

• Anti-Static Agent

Demonstration of the elimination of static electricity in "Vinyon" fabric treated with American Cyanamid Company's Aerotex Softener H: the swatches of "Vinyon" fabric to the left have not been treated, while the swatches to the right were treated. Both sets of samples were briskly rubbed through the fingers a few moments before the picture was taken. It is stated that even long continued rubbing failed to build up any perceptible charge of static in the treated sample. Aerotex Softener H, as an anti-static agent, is applicable to nylon or "Vinyon" yarn type N, acetate rayons and wool. It is equally effective on viscose rayons and cotton, although they are not normally as susceptible to static electricity as some of the other fibers.

• Course on Instruments

The Bristol Company, Waterbury, Conn., manufacturers of automatic controlling, recording, and indicating instruments for industrial applications, is conducting a series of courses for plant instrument and operating men in the Theory and Application of Industrial Instruments. Each course consists of two weeks of intensive lectures and laboratory work, with special emphasis on instrument maintenance and repair. Subjects covered include instruments for pressure, temperature, relative humidity, flow, pH and electrical measurements; pyrometry; pneumatic, electric and electronic control systems, and telemetering.

These courses are open to men interested in the application, servicing, and repair of instruments in all types of manufacturing plants, and are under the direction of F. A. Faust, Education Department, The Bristol Company, Waterbury 91, Connecticut.

• Bulletin on Starches

The United States Testing Company, 1415 Park Avenue, Hoboken, N. J. has prepared an informative bulletin on starches, outlining the procedure of analysis of starch and its efficiency and durability. The outline includes the Moisture Content, Apparent Density, Increase in Weight, Stiffness in Starching, Effect of Flexing on Stiffness, Effect of Exposure to High Humidity upon Stiffness, Ease of Ironing, Resistance to Soiling and Discoloration, and Degree of Settling. This bulletin is available upon request.

Fungicidal Materials—

(Continued from Page 258)

ever, only our contamination method gives definite and reproducible data about the fungicidal properties of compounds or materials when tested against pathogenic fungi.

IX. Fungicidal Value After Contamination in Vitro

This test, which has been experimented in a great number of cases, is an adaptation to fungus testing of our method for the determination of the bactericidal value after contamination. This method, inaugurated a few years ago, and published at that time has been tried and adopted by several bacteriological laboratories for the testing of germicides. Our recent experiments have definitely proven that it can be satisfactorily adapted to the testing of fungicides, whether the test organisms are pathogenic or not.

The purpose of the method is to determine whether materials treated with fungicides have fungicidal properties, and retain these fungicidal properties after a certain number of washings or leachings or after being immersed or soaked in water or other liquids for various periods of time.

These tests are very severe since all materials are contaminated with a fresh test culture of a fungus, or a mixed culture of fungi by total immersion before being submitted to the tests. We generally use T. gypseum, but any fungus, pathogenic or not can be used.

The test is conducted as follows:

Three discs 5/8" in diameter are cut from each sample of material treated with the fungicide being tested, and also after each washing, leaching or soaking, or group of 5 washings, leachings or soaking-time units. They are placed successively in a tube containing 5 cc. of a fresh suspension of a standard test fungus for one minute. The suspension can be made in any sterile solution, such as distilled water, saline or broth at will, as tests have proved that the suspension medium does not have any influence on the results of the tests. Upon removal, the first disc is placed with aseptic precautions in a tube of sterile nutrient broth and swirled for five minutes, removed to a second tube of sterile nutrient broth and swirled for ten seconds, and finally transferred to a third tube of sterile broth.

A second disc is transferred to a first tube of broth and swirled for 10 minutes, and then to a second tube of broth nad swirled for 10 seconds and then removed to a third tube. The third disc is transferred to a first tube of broth and swirled for 15 minutes, and then to a second tube of broth and swirled for 10 seconds and finally removed to a third tube. As controls, three discs cut from the untreated material are handled the same way as the

3 treated discs. All 18 tubes are incubated in a high humidity chamber at a temperature which can vary from 24° C. to 37° C, according to the material tested. Paints are tested at low temperatures, fabrics at higher temperatures. Sabouraud's agar Petri dishes can be used instead of broth tubes if found more convenient. The results are the same in both cases.

The incubation lasts until there is a copious growth in the control tubes. At that time, the test tubes are examined for the presence of growth.

This method is applicable to all kinds of fungicides whether readily soluble in water and having a quick diffusion, or rather insoluble in water and having a high power of penetration in the material. Results for the first group of fungicides are more specific in the first transfer tube. Results for the second group are more specific in the third transfer tube. The results of the second transfer tube, where the excess of fungicide is washed out, have only an informative and not conclusive value. Finally, this method can be advantageously used to replace the old phenol coefficient method, which is not applicable to fungi.

X. Informative and Safety Tests

We now want to say a word about informative tests, which we call safety tests, and which we always conduct in conjunction with the tests we have just described. They are of three types:

(1) Determination of the minimum lethal dose.

(2) Presence of skin irritants.

(3) Presence of cutaneous sensitizers.

No compound is tested according to the above described method unless its minimum lethal dose is sufficiently high and it is safe for use in contact with the skin.

(1) *Toxicity Tests*

The determination of the toxicity of a fungicide or of a material treated with a fungicide is determined by the minimum lethal dose.

Various amounts of various dilutions of the compound or various amounts of extracts of the treated materials are injected into mice to determine the smallest amount of chemical that will cause the death of all injected animals. The results are generally expressed in grams or milligrams by kilogram of body weight or by the minimum dose that would kill a man weighing 150 pounds. Such tests have shown very great differences in toxicity between the most efficient fungicides.

(2) Presence of Skin Irritants

The first step of the test for skin irritants is the animal injection test which consists in injecting intradermally with aseptic precautions into animals dilutions of the fungicide and sterilized extracts of the treated materials. This test should always be negative which means that no skin irritation should be noticed. If the animal injection test shows a positive reaction the compound or material cannot be used against the skin. When the animal injection test is negative it is necessary to proceed to the second step which is a patch test conducted on a minimum of 200 people according to the recommendations of Drs. Louis Schwarz and Samuel Peck of the U. S. Public Health Service. The treated material is tested as is. The antiseptic is tested by impregnating a four ply cotton gauze with the dilution that is to be used for the treatment of the material. The patch is worn for five days after which it is removed. The skin is then observed for skin irritation the day of the removal and the following three days. When there is no irritation the test gives a good indication that the tested fungicide or material does not contain any skin irritants.

(3) Presence of Cutaneous Sensitizers

It is possible that continuous use in contact with the skin of a treated material may cause sensitization of the skin even if a previous patch test did not detect the presence of skin irritants in the used chemical. Therefore it is necessary to conduct a second patch test to determine whether or not the first patch has sensitized the skin. For this reason ten days after the removal of the patch applied during the patch test for skin irritants, another patch is applied under the same conditions as the first one for 48 hours. At the end of this period the patch is removed and observed the same day and also the three following days for reaction. A negative test is an indication that the fabric is not likely to cause an unusual amount of irritation. Should any reaction occur after the first or second patch test, the tested chemical should never be incorporated in a material to be used continuously against the skin nor should the treated material itself be used against the skin.

It is recommended that products which do not cause any primary irritation nor sensitization when tested on a minimum of 200 people, be submitted to a larger scale test by the manufacturer. For instance, a trial sale of 5000 to 10,000 samples shall be made in a community where the cases of dermatitis, if any, will be investigated by a dermatologist.

Sale of the product on a national scale will follow the trial sale only when no cases of dermatitis will have been reported, or when their cause will have been thoroughly investigated and suppressed.

XI. Experimental Results

More than 300 fungicides have been tested for toxicity and skin irritation and sensitization. A great majority of them were discarded, in accordance with the old medical motto: "Primum non nocere".

Among the others, quite a few had to be eliminated because of physical or chemical incompatibility with the materials to be treated, such as undesirable color imparted to fabrics, or cosmetics, precipitation or settlement of lacquers, varnishes, undesirable odor, etc.

Of all compounds tested, only a few long chain phenyl mercuric derivatives have proven to be satisfactory as being non toxic, non irritating, seldom sensitizing, colorless, odorless, readily miscible and compatible with various materials, and easy to apply. The fungicidal properties of one of them against all tested pathogenic fungi are definitely oustanding.

Conclusions

We believe from our own experience that our method will help mycologists by giving them a standard procedure and reproducible results. We will welcome all comments, suggestions and criticisms as we know that such a method has been expected and demanded by several laboratories.

—♦ ♦—

Accelerated Aging—

(Concluded from Page 256)

ACKNOWLEDGMENT

The authors are indebted to the American Viscose Corporation, under whose sponsorship this investigation was conducted at the Ellen H. Richards Institute, The Pennsylvania State College.

This is the second in a series of reports on the accelerated aging of textile fabrics in controlled light fading tests.

BIBLIOGRAPHY

(1) Borton, H. E., and Butz, M., with Moore, P. K., Williamson, D. D., LaBossier, I., Blackmore, B., Kuschke, B., and Mack, P. B., Colorfastness of Women's and Children's Wearing Apparel Fabrics, Journal of Home Economics, 34, Number 8:539-550 (1942).

(2) Borton, H. E., Walker, C. B., Mack, P. B., and Seibert, C. A., The Colorfastness of Certain Types of Dyes on Women's and Children's Wearing Apparel Fabrics, American Dyestuff Reporter, *31*, Number 25:603-627 (1942).

(3) Green, A. G., The Analysis of Dyestuffs, Charles Griffen and Company, London, 1-8, 25-40 (1920).

(4) Hunter, R. S., Photoelectric Tristimulus Colorimetry with Three Filters, U. S. Department of Commerce, National Bureau of Standards, Circular C429 (1942).

(5) Lyle, Dorothy Siegert, Construction and Operation of Accelerated Aging Equipment, American Dyestuff Reporter *36*, Number 22: 623-628, 640 (1947).

APRIL SHOWERS

bring you . . .

BIXAMINE FAST RED 8BL*

***BIXAMINE FAST RED 8BL is a fast to light direct dyestuff which is adaptable for dyeing in all types of machines. Its excellent solubility and level dyeing properties are such as to warrant its use for the dyeing of cotton and rayon for upholstery and drapery manufacture.**

Manufactured by

BICK & CO. INC.

READING • PENNSYLVANIA

*REGISTERED TRADE MARK

E is for Efficiency

E is for Economy

E is for Easy to use

E is for Easy on the Cloth

E

MEANS

DESIZE with EXSIZE!

WRITE FOR FREE BOOKLET

PABST BREWERIES

Copr. 1948 Pabst Brewing Company Milwaukee, Wisconsin

PABST SALES COMPANY

CHICAGO, ILLINOIS

Warehouses at Jersey City, and Textile Warehouse Company, Greenville, S. C.

partners

for brighter prints

Metso added to the soaping off baths lifts the fog of dullness from colored prints. As the detergent ally for your soap, colors are brightened and whites are cleaner and sharper.

Metso* Granular hastens wetting action, deflocculates solid dirt, and because of the unique component, soluble silica, prevents the removed dirt from redepositing on the cloth. All this greater efficiency, and cost reduction, too. Ask for a free sample and further information.

* (R) Phila. Quartz Co.'s Sodium Metasilicate. U. S. Pat. 1898707.

METSO

PHILADELPHIA QUARTZ CO.

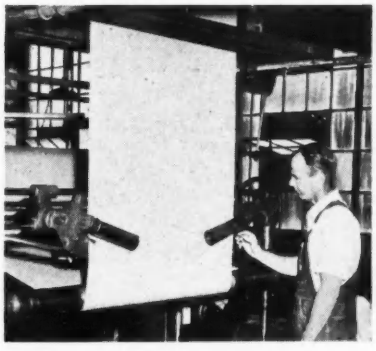
127 South Third St., Dept. B, Philadelphia 6, Pa.

What's your problem?

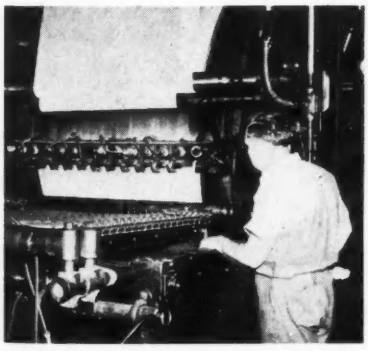
One of these Process Products may improve your Operations...Cut Costs

WOOLENS . . . S V Woolrex Oils, sprayed on your stock, give you longer card runs before stripping, keep fibers soft and pliable during spinning, and then scour out easily with minimum amounts of soap. Get full details.

WORSTEDS . . . With S V Worstex Oils, you can be sure of lofty white tops that *stay* white. You get uniform drawing and gilling, cleaner drawing rolls and more continuous operation. Spinning is improved.

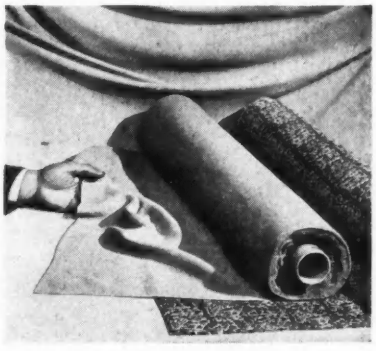


COTTONS (FINISHING) . . . For finishing operations on cotton fabrics, you'll get excellent results with S V Finishing Oils A and B. These products form highly dispersed emulsions, penetrate into the fibers.



COTTONS (PRE-SHRINKING) . . . In pre-shrinking operations, S/V Finishing Oils assure quick, uniform re-wetting. They have proved their superiority in such fabrics as twills, drills and denim, as well as in lighter materials.

COTTON (WATER-REPELLENTS) . . . S/V Fabrisecs AA, BB, MP, add maximum water repellency to your fabrics with minimum amounts used. They're unaffected by atmospheric temperatures and have no objectionable odor.

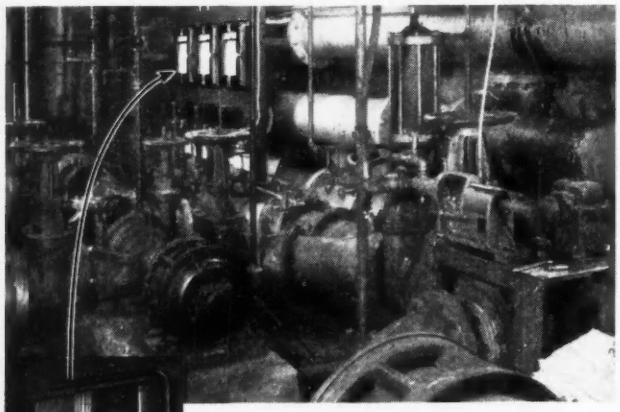


RAYONS . . . If you're processing rayons, investigate Socony-Vacuum's special oils for your operations—S/V Rayon Soaking Oil, S/V Rayon Coning Oil, and S/V Prorex Oil F, for delustering viscose rayon yarns.

Socony-Vacuum Process Products

Process Products
SOCONY-VACUUM

SOCONY-VACUUM OIL CO., INC., 26 Broadway, New York 4, N. Y., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP.



Close-up shows one of the three Micromax pH Recorders used by Arkwright Corp., Fall River, Mass., in the filter plant, Finishing Division. Electrode Unit is located directly below Recorder. pH is recorded: (1) as raw water comes into the filter plant, (2) just after alum and filters and (3) at the clear well.

MICROMAX pH RECORDERS Help Treat Water At Textile Plant

Starting with raw water which varies from 5 to 9 pH, Arkwright had for years been treating to a value slightly above 7. But never before had treatment operated so easily and efficiently as it has since the Micromax Recorders were installed. Instruments are fully automatic; record in great detail across their 2-12 pH range. They operate alarms if pH exceeds preset limits.

L&N instruments can be equipped to provide any desired type of automatic pH control, from simple on-off to fully proportioning. The latter is rapidly coming into wide use because it meets every change in acidity or alkalinity of the liquid with a strictly proportional change in the amount of chemical supplied. Because of the extreme accuracy of this balance, pH is held within entirely new limits, and full advantage is taken of the relationship between quality of water or other product, and control of acidity.

If you have a pH recording problem and will outline it, an L&N engineer will be glad to help select equipment to meet your need.

LEEDS & NORTHRUP COMPANY, 4965 STENTON AVE., PHILA., PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl. Ad N-96-701 (2c)

NEW

a pre-dyeing Nylon Hosiery Scour— safe, speedy, efficient

Equally effective for rayon hosiery and mixtures—woolen and cotton yarns and piece goods—Laurel Triconates, powdered detergents, remove sizing and other foreign matter quickly, safely. Produce clean, soft condition that assures level dyeing—clear shades. For hosiery, can be used in single or split-bath method and in combination with other detergents.

Laboratory and mill-tested Laurel Triconates have won favor with leading hosiery mills and processors because of their high efficiency and economy. Send today for sample and recommendations for use.

soaps, oils, finishes

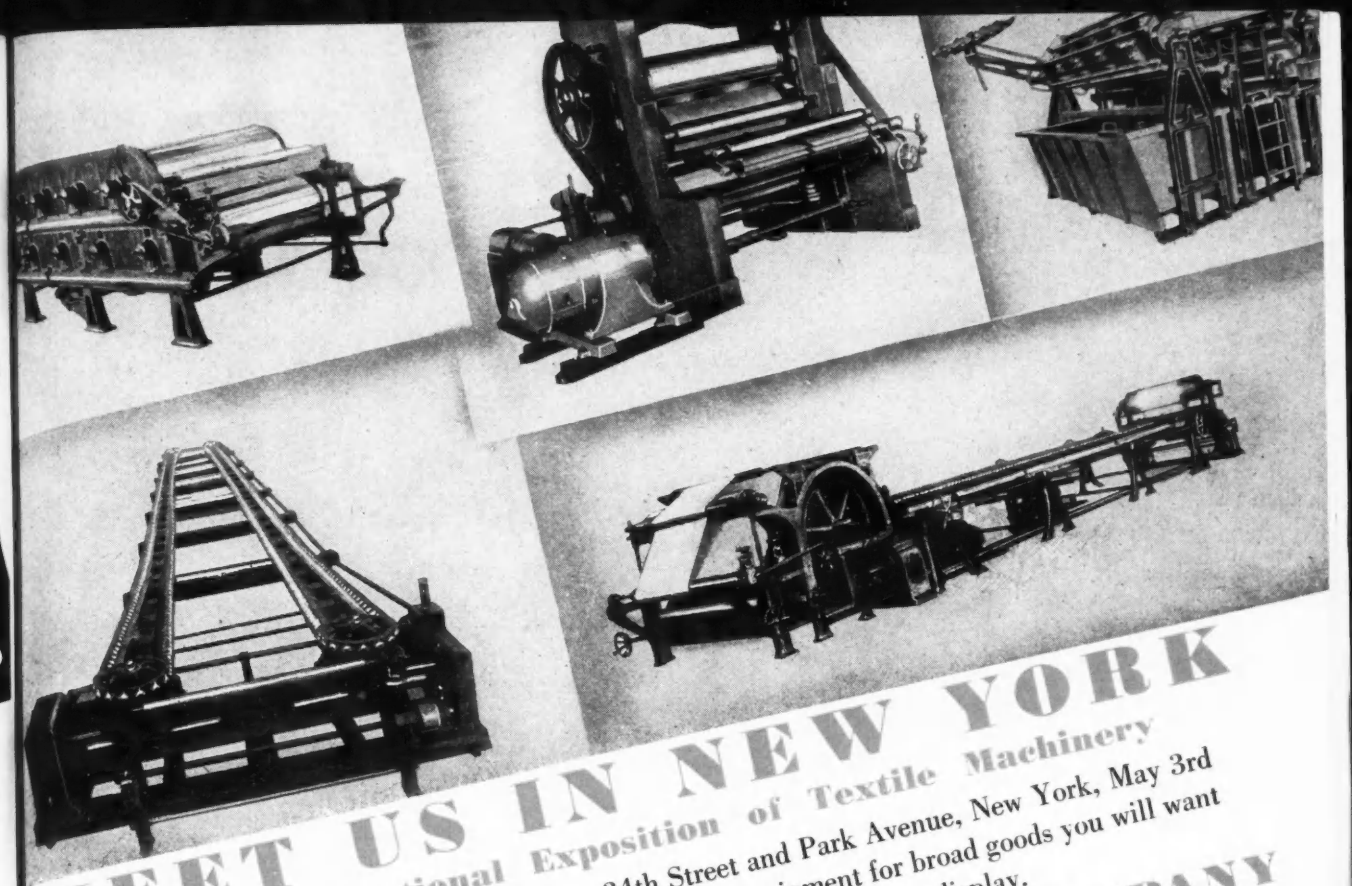
LAUREL SOAP MANUFACTURING CO., Inc.

Wm. H. Bertolet's Sons

ESTABLISHED 1909

WAREHOUSES
Paterson, N. J.
Chattanooga, Tenn.
Charlotte, N. C.

OFFICES
2601 East Tioga Street
Philadelphia 34, Pa.



MEET US IN NEW YORK

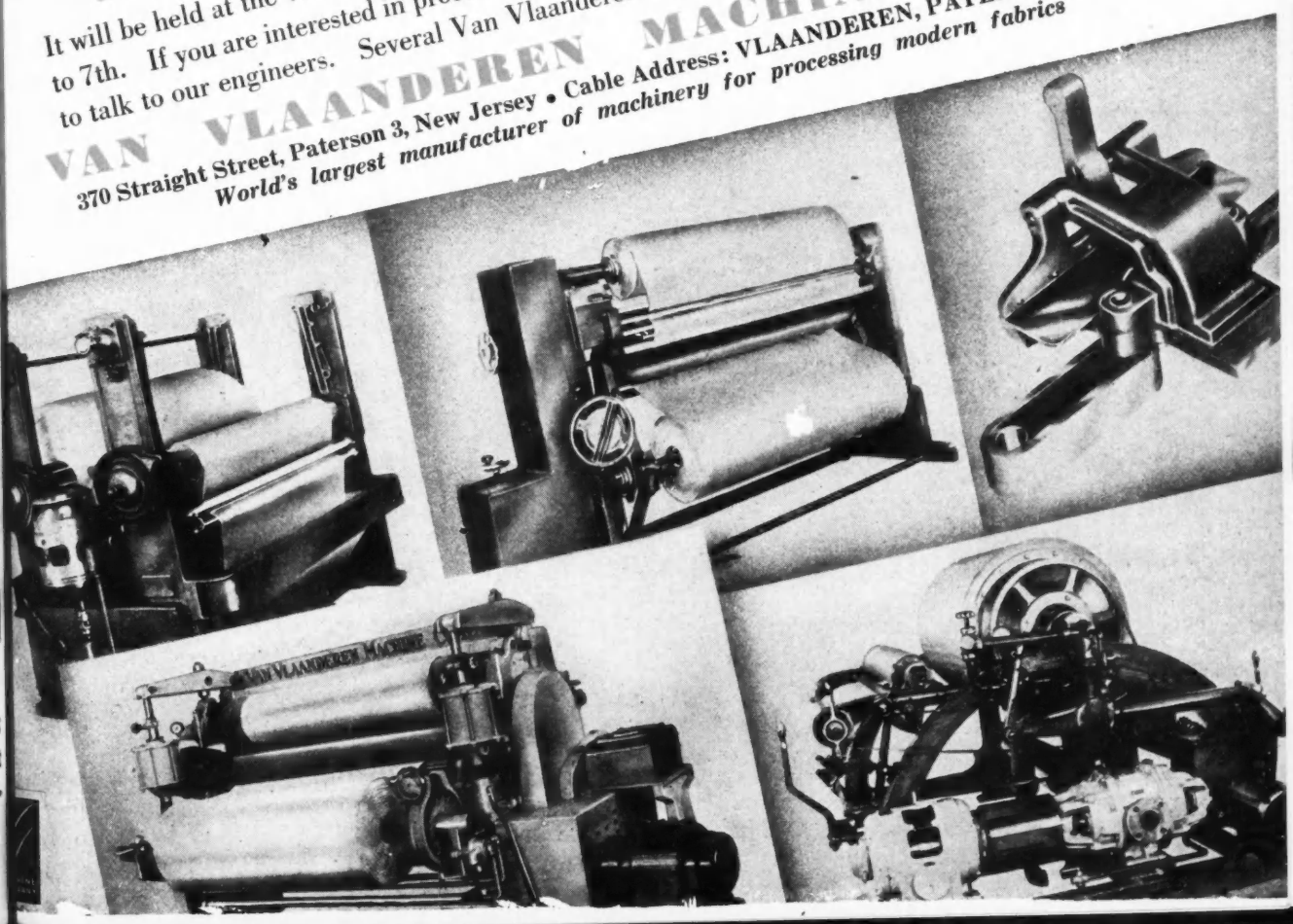
at the International Exposition of Textile Machinery

It will be held at the 71st Regiment Armory, 34th Street and Park Avenue, New York, May 3rd to 7th. If you are interested in processing and finishing equipment for broad goods you will want to talk to our engineers. Several Van Vlaanderen machines will be on display.

VAN VLAANDEREN MACHINE COMPANY

370 Straight Street, Paterson 3, New Jersey • Cable Address: VLAANDEREN, PATERSONNJ, U. S. A.

World's largest manufacturer of machinery for processing modern fabrics



Better slashing assures

BETTER DYEING AND FINISHING

For the mill, the ideal size is one that penetrates the yarn, increases tensile strength, provides needed stiffness, prevents shedding in the loom, and is available in any fluidity. But many sizes interfere with dyeing and finishing operations.

You can meet all mill requirements and yet assure yourself of easy desizing, if you specify Commonwealth's solubilized starch—

Gelaglaze

COMMONWEALTH COLOR & CHEMICAL CO.

MAIN OFFICE AND WORKS: Nevins, Butler and Baltic Streets, Brooklyn 17, N. Y.

PHILADELPHIA • CHICAGO • GLOVERSVILLE • MONTREAL

"TITAN for QUALITY"
DYES, DETERGENTS and TEXTILE SPECIALTIES
★
The Impossible is "that" which we have not yet tried to do
TITAN CHEMICAL PRODUCTS
INCORPORATED
MILL ROAD and WAYNE STREET
JERSEY CITY 6, NEW JERSEY
Representatives in: HINSDALE, N. H., KNOXVILLE, TENN

QUALITY RICHMOND PRODUCTS

An Ideal Combination

FOR PERFECT NYLON **FINISH**

RONYL FINISH - 464

FINISH - W - 466

NYL DULL

•

Send for samples and complete information and see the remarkable results.

Southern Office:
617 JOHNSTON BLDG., CHARLOTTE, N. C. — Phone 2-1428

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.

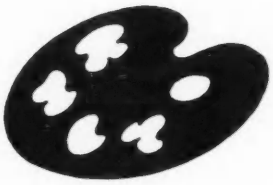
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

DYESTUFFS

DIRECT - ACID - CHROME
FORMALDEHYDE - ACETATE

UNIFORMITY

With a background of many years of approval before the bar of public opinion.



PURITY OF COLOR

Custom made from best quality raw materials, producing products of high standing in the trade.

Stocks Carried by All Dyestuff Distributors in All Textile Centers

YOUNG ANILINE WORKS

OFFICE and FACTORY
2701-2733 Boston St., Baltimore, Md.

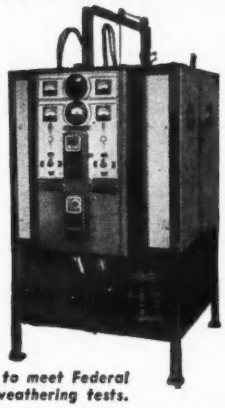
PATERSON OFFICE
50 E. 13th Street, Paterson, N. J.

WEATHERING TEST FOR TEXTILES

Weathering effects of sunlight, rain, heavy dew and thermal shock reproduced in the laboratory at an accelerated rate that reduces years of actual weathering to a few days of testing in the —

ATLAS TWIN-ARC WEATHER-OMETER

The Twin-Arc Weather-Ometer has full automatic control of light and water periods. The Atlas Cycle Timer unit can be set to reproduce any combination of weathering conditions. A direct reading thermal regulator, automatic shut-off switch and a running time meter is included on the control panel. After setting exposure cycle on the control panel the Weather-Ometer is safe to be left in continuous operation over night without attention except to replace carbons once in 24 hours.



The Atlas Weather-Ometer is required to meet Federal Specifications demanding accelerated weathering tests.

ATLAS ELECTRIC DEVICES COMPANY
361 W. Superior Street, Chicago 10, Illinois

Originators and sole manufacturers for over a quarter of a century. . . . Weather-Ometers, Launder-Ometers, Fade-Ometers are the accepted standard accelerated testing machines all over the world.

★ WETTING AGENTS
★ PENETRANTS
★ SULPHONATED OILS
★ SOFTENERS
★ DYESTUFFS
★ SOAPS

BARRY CHEMICAL CO.
APPONAUG • RHODE ISLAND

ACID ALIZARINE BLUE B — Pr. 93

ALIZACHROME BLUE BLACK B — C.I. 1085

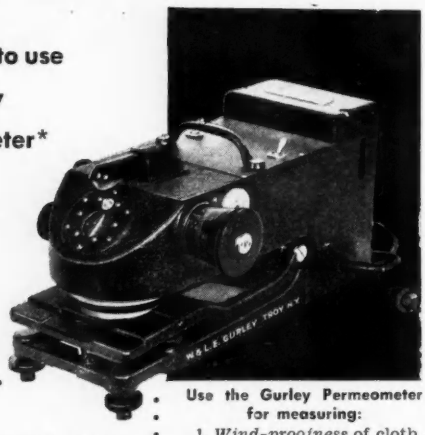
recommended for

ARMY and AIR CORPS DRESS UNIFORMS

Our laboratories are always at your service

ZINSSER & COMPANY, Inc.
ESTABLISHED 1897
Manufacturing Chemists
HASTINGS-ON-HUDSON NEW YORK

Ten ways to use the Gurley Permeometer*



Here's the versatile instrument for quickly and accurately measuring air permeability of fabrics which permit passage of from 1 to 400 cubic feet of air per square foot area at a pressure drop of 0.5" of water. Write for Bulletin No. 1600. W. & L. E. Gurley, 512 Fulton, Troy, N. Y.

GURLEY
Scientific Instrument Makers Since 1845

*Conforms to ASTM "Tent. Meth. of Testing for Air Permeability of Text. Fabrics" D737-43T.

Use the Gurley Permeometer for measuring:

1. *Wind-proofness* of cloth.
2. *Quality* of filter cloth.
3. *Use requirement* of cloth intended to resist or pass air.
4. *Water-resistant* properties.
5. *Coolness* or *warmth* of clothing material.
6. *Construction* of cloth.
7. *Penetration* into cloth of various coatings.
8. *Retention of fillers, starch and sizing* in cloth after laundering or cleaning.
9. *Compactness, nap* or *fiber arrangement* in cloth after fulling, washing, sizing or other treatments.
10. *Amount of wear* after abrasion tests.

QUALITY RICHMOND PRODUCTS

ROSOPEN
for
PACKAGE DYEING

•

Better Penetration
"No Suds"

•

Send for free samples

Southern Office:
617 JOHNSTON BLDG., CHARLOTTE, N. C. — Phone 2-1428

RICHMOND OIL, SOAP & CHEMICAL CO., Inc.
1041-43 FRANKFORD AVE., PHILADELPHIA 25, PA.

Everything you've ever wanted in a Dye Box

Send for further information

THE NEW BLICKMAN
Fully Enclosed
STAINLESS STEEL DYE BOX

1. Greater savings in steam and water
2. Faster loading and unloading
3. Complete visibility
4. Quick changeovers

Visit us: Booth 47 at the International Exposition of Textile Machinery, Equipment and Supplies

S. BLICKMAN, INC.
104 GREGORY AVENUE • WEEHAWKEN, N. J.
Manufacturers of stainless steel textile equipment, dye boxes, linings, cylinders, dry cans, rolls, hoods, tanks

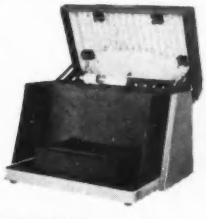
Now! . . you can have
TRUE NORTH LIGHT
24 hours a day, in any weather

WITH THE NEW ANALYTE
North Light Comparator

Finest Color-Matching Light Ever Obtained. Use it Anywhere.

ONLY $350 F.O.B. WORCESTER, MASS.
TRY IT FREE!

At last . . . a dependable source of TRUE NORTH LIGHT, at reasonable cost!
Recognized authorities declare that the new Analyte North Light Comparator achieves the nearest reproduction of true north light ever obtained commercially. The unit is handsome and compact — measures 20 x 20 x 15 inches and weighs only 120 pounds. You can use it in your plant, your laboratory, or on your desk. The Analyte Comparator features two sources of light, for comparative purposes — the Analyte grid for true north light, operated by foot control, and an incandescent bulb controlled by a switch on the machine. The grid is easily replaceable. All parts of the Analyte Comparator are guaranteed for one year.
FREE TRIAL OFFER — We will gladly install an Analyte North Light Comparator for you to use during a generous trial period, without cost or obligation to you. Write today for further information and illustrated literature.



Top tilts back for access to incandescent bulb and grid.

ANALYTE INSTRUMENTS, INC.
Dept. ADR
1450 Broadway New York 18, N. Y.

• CLASSIFIED ADVERTISEMENTS •

OPPORTUNITY FOR TEXTILE CHEMICAL SPECIALTY SALESMAN

The man we are looking for is at present employed, has had ten years or so successful experience in the building up of a following either in New England, southern territory, or Pennsylvania. To such a man we offer an opportunity of a connection with a progressive, well equipped and financially sound manufacturer with the know-how to make a complete line of textile auxiliaries. To the right man we offer a liberal drawing and commission arrangement with a chance to obtain an interest in our business.

Write Box No. 412

POSITION WANTED: As hosiery dyer possessing laboratory research and color control. Seventeen years as head dyer for a large hosiery manufacturer in the South. Excellent references as to ability and character. Write Box No. 402.

POSITION WANTED: Experienced dye tester with degree, postgraduate work, technical sales experience, knowledge of South American languages. Desires position in technical sales, exports, or testing. Write Box No. 418.

TECHNICAL SALES REPRESENTATIVE: Wanted by well-established sizing specialists to help develop line of textile auxiliaries and finishes. Require: young man, at least 5 to 10 years' experience in wet processing and finishing, good sales personality. Good salary for right man, excellent future. Southeast. Write Box 344.

POSITION WANTED: Cotton and rayon piece goods finishing control chemist with 23 years' experience. College graduate, able to assume charge of laboratory. Prefer location north of Virginia along seaboard. Write Box 349.

TEXTILE CHEMIST: Well established manufacturer NYC area seeking textile chemist with extensive knowledge and experience in manufacture and development of textile auxiliaries. Knowledge of dyeing and finishing preferable. Excellent prospects for right man. Write Box No. 420.

POSITION WANTED: Swedish Chief Dyer, bachelor, age, 35, German Dyer school, 15 years experience in bleaching and dyeing cotton, wool, linen, jute, silk and rayon (acetate, viscose and bemberg) mixtures. All types of dyestuffs, machines and phases of dyeing. Experience in continuous pad steam, vat acid, piece goods and yarn. Accurate, energetic, ambitious. Excellent references. Languages English and German. Seeks position for January 1949 in America, Australia or South Africa. Write Box No. 422.

WANTED SALES REPRESENTATIVES: to handle Phila. Upper N. Y. State, Virginia and Texas territories for highly successful color matching instrument with wide application. Excellent opportunity for qualified men. Write Box No. 423.

Established manufacturer of chemicals (not finishes) for tanneries, shoe and textile manufacturers, seeks exclusive agent in New England, Chicago, and West Coast. Write details to Box No. 424.

POSITION WANTED: We can recommend a manufacturer of chemical products for the textile trade, now available for sales or manufacturing. We shall be pleased to give further information on applicant 105. Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass.

FOR SALE

TEXTILE LABORATORY EQUIPMENT

1—Macbeth Skylight Lamp, Model BX 826, 110 volts A.C. 60 cycles.
1—Macbeth Ph. Meter Model A.
1—Balance Scale Fisher, Model No. 1-915, capacity 200 grams, sensitivity 1/100 of milligram, with weights.
1—Crock Meter—Standard Cloth crock recorder of A.A.T.C.C. with counter.
1—Flat Bed Ironer, General Electric.
1—Laundry Tumbler, commercial type.
1—Oven Precision Scientific Co. Catalog No. 1250, 35 degrees to 1800 degrees.

Write Box No. 425

POSITION WANTED: A man with long period of experience in chemistry would like to connect with a manufacturer of products used in the textile industry. Is available for part or full time employment. Prefers New York area. Can assist in sales or technical problems. Address in confidence HJ, c/o Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass.

WANTED:—LABORATORY ASSISTANT. Young Man with knowledge of testing and matching colors on all types of yarns. State experience, education and salary desired.

Write Box No. 427.

POSITION WANTED: Chemist-Chemical Engineer. Fifteen years experience all phases textile processing. Scouring, de-sizing, bleaching, dyeing, finishing. Resin emulsion research, manufacture and application. Laboratory organization and direction. Purchasing, Technical service. Four years chemical process engineering. Synthetic detergent manufacturer. Textile consultant. Two years teaching college chemistry, State University, evenings. Desire position as technical director or director of technical service. Write Box No. 426.

A position is wanted by an experienced textile chemist available for technical sales or demonstrations, New York area preferred. Address in confidence ABC, c/o Charles P. Raymond Service, Inc., 294 Washington St., Boston, Mass.

• CLASSIFIED ADVERTISEMENTS •

NOTICE

CLASSIFIED ADVERTISEMENTS

ARE RESTRICTED TO

HELP WANTED — POSITIONS WANTED

MACHINERY (wanted or for sale)

OTHER TYPE COPY WILL NOT BE ACCEPTED.

American Dyestuff Reporter

WANTED: Assistant Dyer—Capable of dyeing wool-knit goods as well as mixed fabrics.
Write Box No. 428.

WANTED: Chemist familiar with shop routine, trouble shooting and laboratory control, for medium sized dye-house. Handling acetate, rayon, mixed piece goods, including resin finishes, boxes, pads and jigs. Metropolitan area. Could wait for right man; chemist ill—retiring. State full background and salary expected. Write Box No. 429.

WANTED: GRADUATE CHEMIST, experienced, for pleasant connection with small dye-house laboratory. Excellent opportunity for right man. Please state experience, education, age and salary expected. Write Box No. 430.

REPORTER

CLASSIFIEDS

BRING

RESULTS

QUALITY PERFORMANCE

We EXPORT...

DYESTUFFS

While present-day restrictions tend to make international trade rather difficult, in most countries dyestuffs and their related chemicals appear to enjoy preferential treatment.

Our friends abroad know that they can count on our co-operation, and that we will go to great lengths to satisfy their requirements.

We solicit specific inquiries from those to whom such a connection would be of permanent value.

L. L. RONA & CO., INC.

Established 1929

40 Exchange Place
New York 5, N. Y.

Cable Address
"ELRONA"

Have you ordered a Binder for your Reporter copies?

Maroon leatherette, gold lettered, large enough to hold twenty-six issues, only $3.50 post-paid.

Please send check with order to:

AMERICAN DYESTUFF REPORTER

ONE MADISON AVENUE

New York 10, N. Y.

Now Available

10th Edition

Chemical Technology of the Fibers

by DR. LOUIS A. OLNEY

Professor Emeritus of Chemistry and Dyeing
Lowell Textile Institute

President Emeritus
American Association of Textile Chemists and Colorists

TEXTILE ASSOCIATES, INC.
LOWELL TEXTILE INSTITUTE
LOWELL, MASSACHUSETTS

$3.00 per copy

Elementary Organic Chemistry

by DR. LOUIS A. OLNEY

Now available at

$2.00 per copy

TEXTILE ASSOCIATES, INC.
LOWELL TEXTILE INSTITUTE
LOWELL, MASSACHUSETTS

The Theory and Practice of Wool Dyeing

by C. L. BIRD, M.Sc., F.R.I.C.

Lecturer in Dyeing University of Leeds
Editor, Journal of the Society of Dyers and Colourists

Now Available at

12/6

Order should be forwarded with remittance to

THE GENERAL SECRETARY
THE SOCIETY OF DYERS AND COLOURISTS
32-34 PICADILLY, BRADFORD, YORKSHIRE, ENGLAND

ANDOTEX*

PIGMENT PRINTING COLORS
for TEXTILES

NEW BRIGHT COLORS
Distinguished for
EXCELLENT FASTNESS to
SUNLIGHT, WASHING and CROCKING

*Reg. U. S. Pat. Off.

ANDERS Chemical Corp. 26 POPLAR ST., E. RUTHERFORD, N. J.

ccc

ANILINE OIL

•

CRESYLIC ACID

•

XYLIDINE

COALTAR CHEMICALS CORPORATION
William D. Neuberg, President
GRAYBAR BLDG., 420 LEXINGTON AVE., NEW YORK 17, N.Y.
TELEPHONE: MURRAY HILL 5-9508
CABLE: "COALTARKEM"

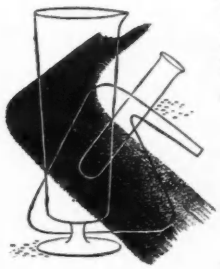
GLYCERINE
...quickly available

Armour's 332 stock points mean fast, dependable service

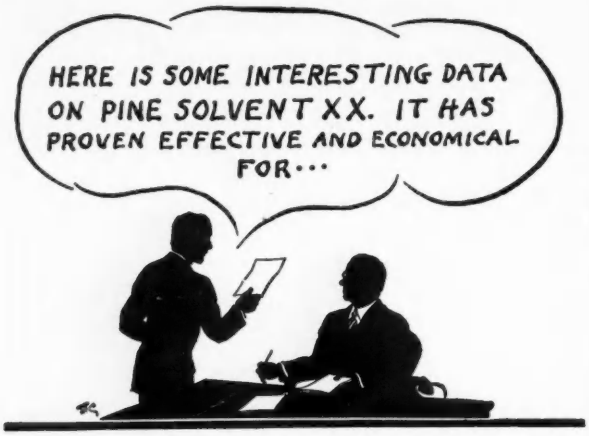
U. S. P.... A chemically-pure, water-white glycerine, meeting all requirements of the U. S. Pharmacopoeia . . . for use in foods, pharmaceuticals, cosmetics or any purpose demanding highest quality. Specific gravity, 1.249—25° C./25° C.

HIGH GRAVITY... A pale yellow industrial glycerine. Specific gravity, 1.262—15.5° C./15.5° C.

DYNAMITE . . . Made especially for the explosives trade. Specific gravity, 1.262—15.5° C./15.5° C.



ARMOUR AND COMPANY
1355 W. 31st St., Chicago 9, Illinois



COTTON: In the kier, Pine Solvent XX brings the liquor in contact with every fiber, leaves uniform bottoms that dye and finish more evenly. Boiling time is cut. Fibers are softer, fuller, more resistant to age-discoloration.

WOOL: Pine Solvent XX is valuable in raw-wool scouring . . . irreplaceable in fulling. From the raw stock it produces clean, soft, really white wool in prime condition for storage or further processing. In the fulling mill, it cuts time as much as 30% . . . costs no more . . . helps you meet contract delivery dates on time.

RAYON: In boiling off, Pine Solvent XX rapidly emulsifies gelatinous materials . . . is safe for the most delicate fabrics. Used in dyeing, it makes the fabrics wet out and sink quickly.

DYEING: Pine Solvent XX makes dye liquor penetrate the hardest fibers and heaviest seams. It gives an even, level deposit of dyestuff of uniform depth throughout every fiber. Loose dyestuff and impurities are suspended for washing out completely.

PRINTING: In printing paste, Pine Solvent XX wets pigments thoroughly, disperses them evenly, and holds them in suspension without agglomeration until the design is on the fabric. Designs are sharp, colors bright and clear, no specks are formed.

CUT TIME AND COST– IMPROVE RESULTS IN ALL WET PROCESSING WITH BURK-SCHIER PINE SOLVENT XX

Burk-Schier Pine Solvent XX Reduces Surface and Interfacial Tensions . . . Wets, Penetrates, Suspends, Disperses . . . Aids Detergents and Dyes. A Little Does a Lot and Does It Well.

SCOURING WETTING PINE-SOLVENT BLEACHING DYEING

BURKART-SCHIER CHEMICAL CO.

BURK-SCHIER CHATTANOOGA, TENNESSEE BURK-SCHIER

PENETRANTS • SOFTENERS • SOLUBLE OILS FINISHES

• INDEX TO ADVERTISERS •

Alco Oil & Chemical Corp.	
Althouse Chemical Co., Inc.	XXVI
Amalgamated Chemical Corp.	
American Aniline Products, Inc.	III
American Cyanamid Co. (Ind. Chem. Div.)	Back Cover
American Dyewood Company	
American Key Products, Inc.	
Analyte Instruments Inc.	XXXV
Anders Chemical Corp.	XXXIX
Arkansas Company, Inc.	IV
Armour & Co.	XXXIX
Arnold, Hoffman & Co., Inc.	
Atlantic Chemical Co., Inc.	V
Atlantic Refining Company, The	XI
Atlas Electric Devices Co.	XXXIII
Barry Chemical Co.	XXXIII
Becco Sales Corp.	XVIII
Bick & Co., Inc.	XXVII
Blickman, Inc., S.	XXXV
Burkart-Schier Chemical Co.	XL
Butterworth Sons Co., H. W.	XLII
Calco Chemical Division American Cyanamid Co.	XV
Calgon, Inc.	
Campbell & Co., Inc., John	X
Carbic Color & Chemical Co. Inc.	XXIV
Carbide & Carbon Chemicals Corp.	VII
Ciba Company, Inc.	
Clover Chemical Co.	XLI
Coaltar Chemicals Corp.	XXXIX
Colgate-Palmolive-Peet Co.	
Commonwealth Color & Chemical Co.	XXXII
Drew & Co., E. F.	
Du Pont de Nemours & Co., E. I.	
Dyestuff Division	Front Cover
Fine Chemicals Division	
Emery Industries, Inc.	
Fancourt & Co., W. F.	XIV
Geigy Company, Inc.	
General Chemical Division, Allied Chemical & Dye Corp.	
General Dyestuff Corp.	XIII
Girdler Corp., The	
Grinnell Co., Inc.	
Gurley, W. & L. E.	XXXIV
Hardesty Co., W. C.	
Hart Products Corp.	XXII
Heyden Chemical Corp.	
Hooker Electrochemical Co.	
Interchemical Corp., Textile Colors Div.	
International Salt Co. Inc.	
Kali Manufacturing Co.	
Kelco Co.	
Laurel Soap Mfg. Co., Inc.	XXX
Leatex Chemical Co.	
Leeds & Northrup Co.	XXX
Mac Beth Corp.	
Mathieson Alkali Works, Inc.	
Maywood Chemical Works	
Monsanto Chemical Co.	VIII, IX
National Aniline Division, Allied Chemical & Dye Corp.	XIX
National Starch Products	
National Carbon Co., Inc.	
Newport Industries, Inc.	XLI
Nopco Chemical Co.	
Nova Chemical Corp.	
Nyanza Color & Chemical Co.	
Onyx Oil & Chemical Co.	XXI
Pabst Sales Company	XXVIII
Patent Chemicals, Inc.	
Perkins & Sons, Inc., B. F.	
Philadelphia Quartz Co.	XXVIII
Procter & Gamble	XII
Refined Products Corp.	XVII
Richmond Oil Soap & Chemical Co., Inc.	XXXII, XXXIV
Riggs & Lombard, Inc.	
Rohm & Haas Company	
Rona & Co. Inc., L. L.	XXXVII
Royce Chemical Co.	
Rumford Chemical Works	
Sandoz Chemical Works, Inc.	
Scholler Bros., Inc.	Third Cover
Sindar Corp.	
Smith, Drum & Co.	
Socony-Vacuum Oil Co., Inc.	XXIX
Solvay Sales Div., Allied Chemical & Dye Corp.	XVI
Sonneborn Sons, Inc., L.	VI
Standard Brands, Inc.	
Standard Chemical Products, Inc.	
Stein Hall & Co., Inc.	
Tennessee Eastman Corp.	
Textile Book Publishers, Inc.	
Titan Chemical Products, Inc.	XXXII
Union Carbide & Carbon Corp.	VII
United Chemical Prod. Corp.	
U. S. Stoneware Co.	
Vanderbilt Co. Inc., R. T.	
Van Vlaanderen Machine Co.	XXXI
Vellner, Eugene	
Virginia Smelting Co.	XXIII
Wallerstein Co., Inc.	
Warwick Chemical Co.	Second Cover
Watson-Park Company	XX
Wolf & Co., Jacques	
Young Co., J. S.	XLI
Young Aniline Works	XXXIII
Zinsser & Co., Inc	XXXIV
Zurn Co., O. F.	

XXVI
III
ck Cover
XXXV
XXXIX
IV
XXXIX
V
XI
XXXIII
XXXIII
XVIII
XXVII
XXXV
XL
XLII
XV
X
XXIV
VII
XLI
XXXIX
XXXII
nt Cover
XIV
XIII
XXXIV
XXII
XXX
XXX
VIII, IX
XIX
XLI
XXI
XXVIII
XXVIII
XII
XVII
, XXXIV
XXXVII
rd Cover
XXIX
XVI
VI
XXXII
VII
XXXI
XXIII
d Cover
XX
XLI
XXXIII
XXXIV
, 1948

Use NEWPORT *White* PINE OIL

Because it reduces interfacial tension and has great penetrating power.

Because it rapidly wets out unbleached cotton.

Because it produces fast, uniform leveling of dyestuffs.

Because it increases the efficiency of other processing reagents in soil removal.

Because it is an excellent solvent for greases and waxes.

Because its fungicidal and disinfectant properties prevent formation of mildew.

Because it is nontoxic to humans.

Because it is very slightly water soluble.

Because it mixes readily with soaps and sulfonated oils.

Because its volatility is low compared to most solvents.

Because it is reasonable in cost.

Because it is comparatively unreactive chemically.

NEWPORT INDUSTRIES, Inc.
230 PARK AVENUE NEW YORK 17, N. Y.

LOGWOOD BLACK

FOR
LEATHER • WOOL • SILK
COTTON • FUR • HAIR
PIGMENTS

DEPENDABLE SOURCE OF SUPPLY
ECONOMICAL - RELIABLE

LOGWOOD HEMATINE QUEBRACHO
TANNIC ACID SUMAC QUERCITRON
FUSTIC GAMBIER FLAVINE

YOUNG EXTRACTS--SERVING THE INDUSTRY SINCE 1869

THE J. S. **YOUNG** COMPANY

OFFICE and FACTORY
2701-2733 Boston St., Baltimore, Md.

Manufacturers of
SYNTHETIC TEXTILE CHEMICALS

CLOVER CHEMICAL CO.

EAST PROVIDENCE RHODE ISLAND

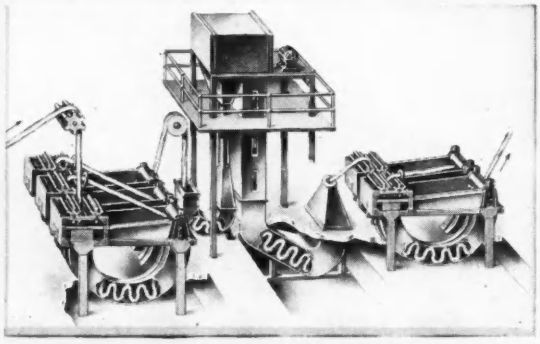
Tale of a Shirt

What makes a good "T"-shirt?

Ask the bleachery superintendent—he looks for a good permanent white, no loss in elasticity, no loss in strength, low weight loss, minimum loss in natural softness and hand.

Ask the mill owner—he checks production figures, calculates chemical and labor costs, balances daily output against his investment in plant and equipment.

No matter what your knit goods bleaching requirements may be, perhaps you can do it better—for less—with a Butterworth Continuous Bleaching Range. Give us a few facts about the class and weight of goods you are bleaching and your daily output. Let us suggest how Butterworth experience and Butterworth Machines can help you to get superior bleaching results at low cost.



Butterworth Continuous Bleaching Range for knit goods. Tension is minimized by special piling and tension devices in the high speed Slack Washer, special reels and piling mechanism in the streamlined "J"-box.

Butterworth

H. W. BUTTERWORTH & SONS COMPANY, Phila. 25, Pa.

PROVIDENCE DIVISION, Providence, R. I. - 1211 Johnston Bldg., Charlotte, N. C. - W. J. Westaway Co., Hamilton. Ont. - ARGENTINA: Storer & Cia., Buenos Aires - AUSTRALIA: Noel P. Hunt & Co., Ltd., Melbourne - BELGIAN CONGO: Paul Pflieger & Co. - BOLIVIA: Schneiter & Cia., Ltda., La Paz - BRAZIL: Cia. Industria e Commercia, Glossop, Sao Paulo e Rio de Janeiro - CHILE: Schneiter & Cia., Ltda., Santiago - COLOMBIA: C. E. Halaby & Co., Medellin - CUBA: Thos. F. Turrull, Havana - ECUADOR: Richard O. Custer, S. A., Quito - FRANCE Georges Campin, Le Perreux, Seine; Rene Campin, Sceaux, Seine - MEXICO: Slobotzky, S. A., Mexico, D. F. - MIDDLE EAST, MEDITERRANEAN, BALKANS, AUSTRIA, HUNGARY, CZECHO-SLOVAKIA, INDIA: Arlind Corporation - NORWAY: Dr. Ing. Otto Falkenberg, Oslo - PERU: Custer & Thommen, Lima - SOUTH AFRICA: Texmaco, Johannesburg - SWEDEN: Elof Hansson Goteborg. - URUGUAY: Storer & Cia., Ltda., Montevideo - VENEZUELA: Herbert Zander & Co., Caracas.

Curtain Call . . .

. . . again and again. A thrilling performance made possible only by years of study, preparation and experience . . . Beauty, delicacy, allure and appeal,— *a truly great finish* deserving highest recognition and acclaim.

And so it is with the millions of "repeat performances" of hosiery finished with *DuraBeau,*—hosiery that not only makes lovely legs lovelier, but assures milady of "miles more wear".

DuraBeau imparts that exclusive "film of beauty and protection" to all hosiery.

DuraBeau
Reg. U. S. A. and Canada
TEXTILE FINISHES

SCHOLLER BROS., INC.

Mfrs. of Textile Soaps, Softeners, Oils, Finishes • Collins & Westmoreland Sts., Phila. 34, Pa. • St. Catharines, Ont., Can.

for *Lovely Textures*

achieve
superior
processing
results...
economically!

with

CYANAMID
SULFONATED OILS

Why? Simply because you cut costs
by using these superior oils in your processing.

Have the economies all on your side,
by having Cyanamid Sulfonated Oils work efficiently,
dependably to bring you consistently top-quality results.

Remember . . . *from source through sulfonation,*
Cyanamid controls the quality.

A WIDE RANGE OF SUPERIOR OILS

is becoming more generally available as Cyanamid's channels of raw material supply continue to open up.

AMONG CYANAMID PRODUCTS FOR THE TEXTILE INDUSTRY ARE . . .

AQUASOL* Sulfonated Castor Oils; NO-ODOROL* Finishing Oils; DECERESOL* Wetting Agents; PARAMUL* 115 Water Repellent; Penetrants, Softeners, Finishes, Sizing Compounds, and other specialties and Heavy Chemicals.

For low-cost chemical equivalent of distilled H_2O... FILT-R-STIL* Demineralizing Units

*Reg. U. S. Pat. Off.

AMERICAN Cyanamid COMPANY • *Industrial Chemicals Division*

30 ROCKEFELLER PLAZA • NEW YORK 20, N. Y.

SALES OFFICES: Boston, Mass. • Philadelphia, Pa. • Pittsburgh, Pa. • Baltimore, Md. • Charlotte, N. C. • Cleveland, O. • Cincinnati, O. • Chicago, Ill. • Detroit, Mich. Kalamazoo, Mich. • St. Louis, Mo. • Los Angeles, Cal. • San Francisco, Cal. • Seattle, Wash. • *In Canada:* Dillons Chemical Co. Ltd., Montreal and Toronto